EASI-BILD 896

\$6.95

ROOFING SIMPLIFIED

DONALD R. BRANN



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EIGHTH PRINTING — 1983 REVISED EDITION

Published by

EASI-BILD DIRECTIONS SIMPLIFIED, INC. BRIARCLIFF MANOR, NY 10510

Library of Congress Card No. 81-65487

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FIRST PRINTING © 1969

REVISED EDITIONS 1971,1972,1974,1975, 1977,1979,1983

ISBN 0-87733-896-5

NOTE:

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A THOUGHT WORTH CONSIDERING...

From early childhood through many of our adult years, we make decisions that shape the way we will live. With hardly a second thought, we refuse to reconsider certain tasks because at one time they were out of our sphere of activity. While not everyone has the imagination, guts or courage to face problems that frightened them yesterday, those who read this book, and follow simplified directions, discover new ways to solve costly and important problems.

A case in point is climbing a tall ladder, walking and working on a roof. Both areas are out of bounds for many people, yet it's one area of activity everyone can do in complete safety when they learn HOW. This book explains how to make a roofer's body harness, how to use a roofer's safety line, how to properly lash a ladder in place, walk and work on a roof in complete safety. When directions are followed, it's easier to work on a roof than cross many streets.

Even those who do none of the work can make substantial savings when they learn what needs to be done and buy material needed. Doing something today you didn't think you could do yesterday provides some of life's happiest hours. To live more is to do more.

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TO LEARN AND SAVE — READ, LOOK, LISTEN

A roofing repair or application may seem like a big deal, but it's nowhere near as big as some fast buck home improvers like to describe it. To get the basic facts and to analyze how you can do what directions in this book clearly explain, do this. Read the book slowly. As you read, jot down any questions that might arise. When you see the answer to each question, draw a line through that question. If after a complete reading, any questions still remain, ask your building supply retailer to explain.

Through the years, readers of every age and income level have written to explain how they successfully applied a new roof, reroofed over existing roofing or made repairs that saved them a bundle. All mentioned never having done or even considered doing any roofing before.

Those who call in a roofer when one is urgently needed discover one fact of life. The bigger the emergency, the more the cost of the repair. Many will estimate cost on what they think you will pay. Others base theirs on how little you know what needs to be done.

Read this book through once or twice and you'll soon learn how a roof is applied, how it can be reroofed, how to make needed repairs. Talk intelligently to a roofer and you not only win instant respect, but he will be more likely to quote a realistic cost, providing you don't want to do the work yourself.

Living requires self confidence. An ability to create an ego to obtain the respect you deserve. Learning to apply roofing can create a new you.

Repairing a roof or making a new application only requires nailing one shingle at a time. Learn to apply one and you can apply a thousand.

After reading through this book, phone one or two roofing companies. Explain that you have a roofing problem and would like to discuss costs. Inquire where they are presently repairing or applying your kind of roof. Drive out and watch the men work. If you know what they should be doing, and watch them do it, you can easily estimate the time it takes to apply X number of shingles. This provides a logical way to figure how long it would take to do what you need done. When an interested roofer finally inspects your house and tells you it will take so many men so many days, you can easily tell whether he's "giving you the business." Being able to intelligently discuss the time and material required helps develop rapport. A roofer will be interested in offering a fair estimate if he seriously wants the job.

While many smooth talking, fast buck home improvers will quote an acceptable estimate, you have no guarantee they will use the quality of material or do the work as they promise, unless you can be on hand to actually see it done.

As you read through this book, you will see how a quality roof is applied over #15 felt in a new application, and how roofing is applied over an existing roof. Use these step-by-step directions to appraise everything the roofer tells you he will do. If you decide to hire one, be sure each step from eave to gable flashing, starter strip, etc., is detailed in his written estimate.

As directions suggest, measure roof area. Estimate total number of squares (shingles to cover 100 square feet) will be needed; amount of eave, gable, valley and chimney flashing, asphalt cement, #15 felt, etc., will be required. Shop for this material so you know total costs. Subtract material cost from total estimate a roofer submits, and you get some idea as to what his or your labor is worth.

Be sure to ask whether roofer plans on including copper, aluminum or 90 lb. mineral coated roofing when applying

flashing to valleys, eave and gable ends. Unless you ask, the roofer will seldom raise the point and you won't get a quality job.

Learning how a roof should be applied can save hundreds of dollars and an equal number of headaches. Learning to negotiate intelligently insures getting a better job at a fairer price. But remember, "In God We Trust." Unless you can be on hand to see the work being done, you could be surprised.

Since a roofing job is frequently a one time buy, many fast buck operators justify exorbitant estimates by saying it is going to take so many men, X number of days. When they actually do the work, you discover one man and a helper complete the job in a third or half the time originally stated. Be especially wary of any roofer or home improver who attempts to talk you into signing a contract because he might not "fit you into his busy schedule." Always get an estimate from a reliable retailer for all material costs.

While every trade takes skill, experience, tools and material, what one man can learn, so can others of equal intelligence. Learning to do today something you didn't think you could do yesterday is nature's way of keeping you alive, young and solvent.

Read this book through completely, not once, but two or three times. Note each illustration when mentioned. Since many steps refer to all roofing jobs, while others only concern a specific kind of shingle, place a check mark alongside each paragraph that concerns your roofing problem. When you learn how the roof was applied, it's easier to make repairs.

Because of eye or ear trouble, some people should never work on a roof. They are not physically capable of orienting their physical activity to height. Many who fear doing something they haven't done before discover that fear disappears when they consider the safety measures recommended. Working on a roof after proper precautions have been taken isn't difficult, and with care, it's even safer than crossing many streets. But always remember one thing, doing anything for the first time creates a certain amount of fear. This is a normal and natural reaction. Fear is actually a stimulant that sharpens the senses. Consider fear a friendly agent who wants to keep you well and alive. When necessary safety measures have been taken and you realize the ladder can't move because it's lashed securely in place; and you can't fall because you have a safety line anchored to the opposite side of the house, walking and working on a roof loses its danger but still holds its glamour.

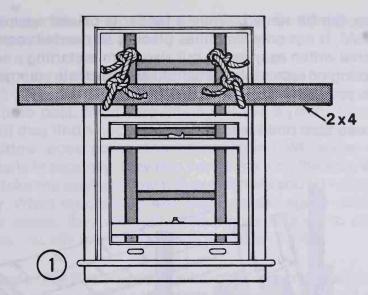
Always consider the occupational hazards before starting a roofing job. Regardless of the emergency, don't work on a roof during rain, lightning or when a strong wind is blowing, or when the atmosphere is charged with electricity prior to a summer storm. Don't go on the roof when the morning dew or rain makes it slippery.

Be sure to disconnect the AC plug to your TV set. Phone the TV serviceman to find out whether your antenna holds an electrical charge. Regardless of what he tells you, don't go near the antenna if the roof is wet, and don't go near it if he so advises. If he suggests disconnecting the antenna, do so only if he explains how.

Don't work close to overhead power lines.

While raising a ladder on soft or sloping ground can be hazardous, it can be done safely if the feet are placed on solid planks, and the ladder is lashed securely to the house.

Anchor ladder securely at base and have someone steady the ladder until it can be anchored securely halfway up. If you are working on a two story roof, open a second story window and lash the ladder to a broom handle or 2 x 4 placed across the window frame, Illus. 1.

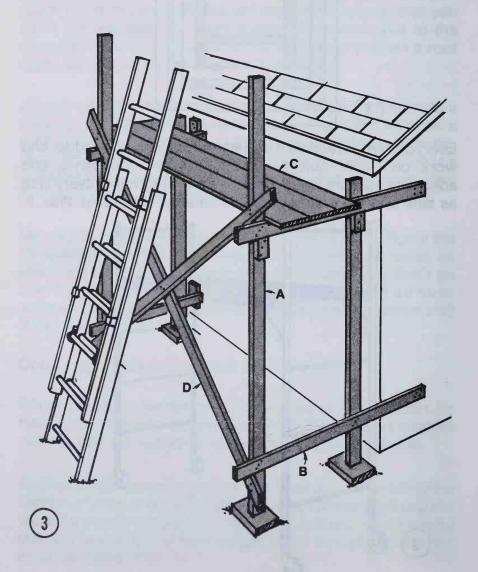


Everyone who watches a skilled roofer climb up a ladder and work on a roof quickly realize it takes confidence and adequate equipment to insure safety. They make every step as safe and easy as possible. Most erect a scaffold, Illus. 2.



These can be rented. When a ladder is placed against the scaffold, it not only simplifies placing all needed tools and material within easy reach, but also permits starting a new or reroofing or repair job. A scaffold also protects your gutters while you climb on and off the roof.

You can also build a scaffold, Illus. 3.

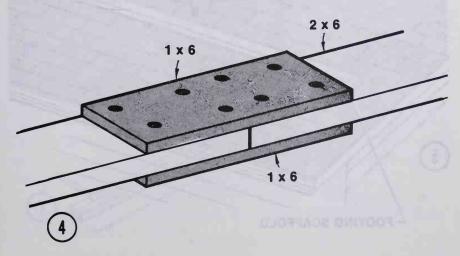


Use 2 x 4 posts A. If posts are placed on earth, toenail posts A to short pieces of 2 x 6.

Place posts A about three feet from house and hold in place with 1 x 6 or 2 x 4 cross braces B nailed to house. Use a level to plumb post. Most carpenters will use 8 penny finishing nails if they find it necessary to drive nails into casing around a window, door, corner trim or into siding. While they drive the nails in securely, they don't drive them all the way. When they take the scaffold down, they pull nails and fill holes with putty. When touched up with paint, no damage is visible. In other cases, they will nail short pieces of 2 x 4 to side of house, usually into a stud, then nail B to 2 x 4.

The top brace B is placed at a height that permits sitting on scaffold when applying the starter course. Select 2 x 4 posts that are free of loose knots. Posts can be spaced 8 feet apart, then cross braced with 1 x 6 D. Always make certain post is plumb before nailing cross bracing D.

Use 2 x 6 posts if you need to build a two story scaffold. While a single length of 2 x 6 is preferable, two pieces can be used. Butt 2×6 end to end and nail 1×6 gusset plates on both sides to reinforce joint, Illus. 4. Brace posts to house midway between floors and also at eaves.



Use 2 x 6 or 2 x 8, free of knots, for platform C. Nail these together with cleats across bottom. Butt cleats against B.

If you rent a scaffold, follow assembly directions provided by rental store.

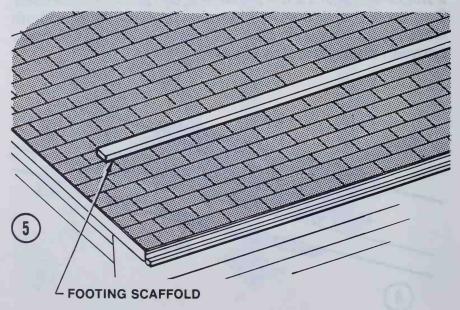
FOOTING SCAFFOLD

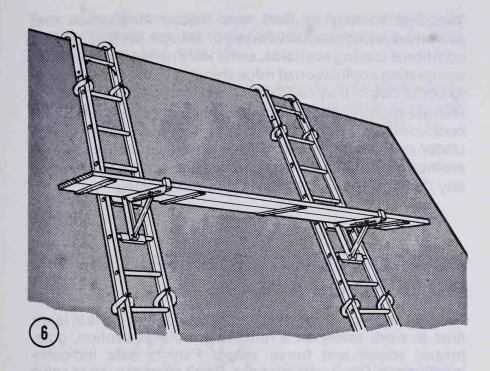
When you work on any roof that has a pitch greater than 5" in 12", note Illus. 21, you usually need a footing scaffold, Illus. 5. These are spaced where needed.

Or you can rent ladders and adjustable scaffold brackets, Illus. 6. These can be adjusted to pitch of roof.

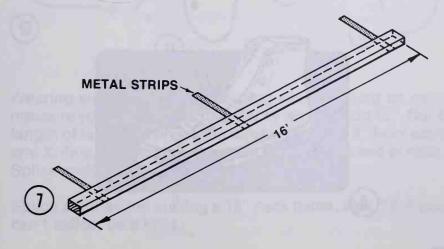
Be sure to follow manufacturer's directions when adjusting ladder brackets.

Cut four pieces of garden hose. Insert wire through hose. Fasten hose to ladder, Illus. 6. This raises the ladder and provides better footing, as well as protects the roof.





Those working on a steep roof should do what "ole time pros" always did. They nailed three 2" wide 16" strips to each 2 x 4, Illus. 7. After laying the starter course and the first two or three courses of shingles working off a scaffold, they nailed the strips through the #15 felt into sheathing and rafter. They drove these nails all the way.



The first footing scaffold was placed in position that permitted laying the next course of shingle. As they needed additional footing scaffolds, same were nailed in place. After completing application of ridge shingles and they were ready to come down, they carefully raised the bottom edge of the shingle slightly. Using tin snips they cut the strips flush with bottom edge of shingle. Asphalt cement was applied to area under raised shingle and same was pressed into place. This method not only provided safe ascent, but also prevented any damage to the new roof while descending.

HOW TO OVERCOME THE FEAR OF WORKING ON A ROOF

The first and most important part of any roofing job is to learn how to work safely on a roof. This requires caution, guts, proper shoes and horse sense. Playing safe indicates intelligence. Don't take chances. Don't attempt a job to solve an argument concerning your ability or courage. Don't start when you are tired. Don't go up on a roof during or directly after a rain storm or when the roof is covered with morning dew. Wear high laced, rubber soled, non-skid sneakers, Illus. 8. Be sure they are ankle high and laced. Don't use slip-ons or low shoes. Wear as little loose clothing as weather permits.



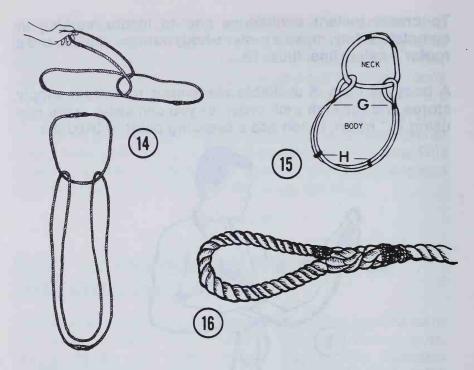
To create instant confidence and to insure working in complete safety, make a roofer's body harness, Illus. 9, and a roofer's safety line, Illus. 19.

A body harness is available readymade from boat supply stores and through mail order, or you can easily make one using %" nylon. Nylon has a breaking point of 3400 lbs.



Wearing clothing you will be using while working on roof, measure your chest girth, multiply by two and add 10". Cut a length of %" line. Using nylon thread, wrap line 4" from each end X, Illus. 10. Separate the three strands, tape end of each. Splice ends together, Illus. 11.

Splice another line making a 15" neck halter, Illus. 12. If you can't splice, tie a knot.



Place big loop through small loop, Illus. 13; place in position shown, Illus. 14.

Wrap with nylon thread at G, also at H, Illus. 15.

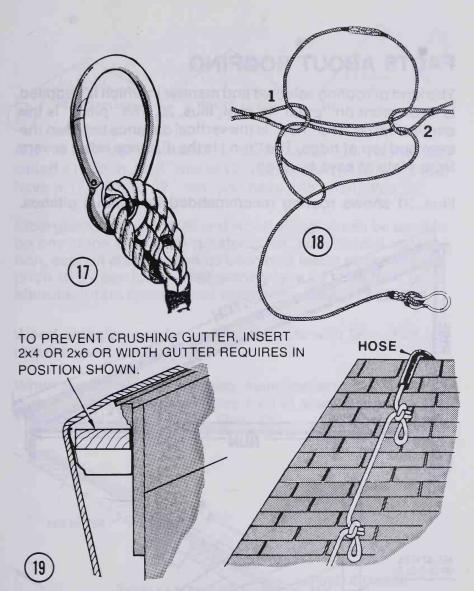
Cut another 6 or 8' line. Make 4" eyes at ends, Illus. 16.

Fasten a snap safety hook to one end, Illus. 17. Use this as your body safety line.

Slip line through hook, then through 2 and 1, Illus. 18.

Using %' nylon, make a roofer's safety line, Illus. 19. Slip a 2 or 3' piece of hose through line to middle of length. Make 3' loops every 3'.

To get safety line in position, use a ball of kite line and a rubber ball. Tie kite line to rubber ball and throw ball over roof. Tie end to nylon and pull it over ridge. When you get up on roof, position rubber hose over ridge.



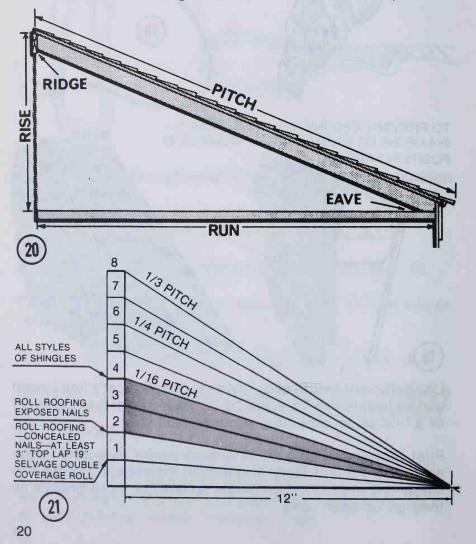
Use sufficient length of 3/8" nylon for your roofer's line so end can be lashed to a 2 x 4 placed across inside of the upper half of a first or second story window, Illus. 1.

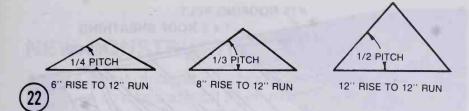
First timers climbing an extension ladder extended to the eave of a second story find instant courage in having this safety line in position on ladder so one hand can grasp it as they go up each rung.

FACTS ABOUT ROOFING

The kind of roofing selected and manner in which it's applied is dependent on "pitch" of roof, Illus. 20. The "pitch" is the angle of rafter. The "rise" is the vertical distance between the eave and top of ridge. The "run" is the distance rafter covers from plate at eave to ridge.

Illus. 21 shows roofing recommended for various pitches.



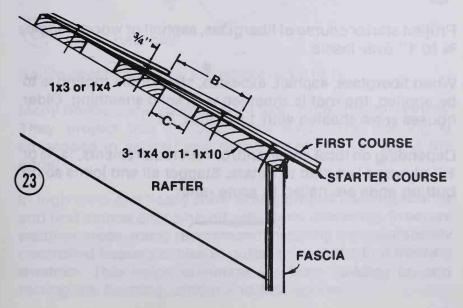


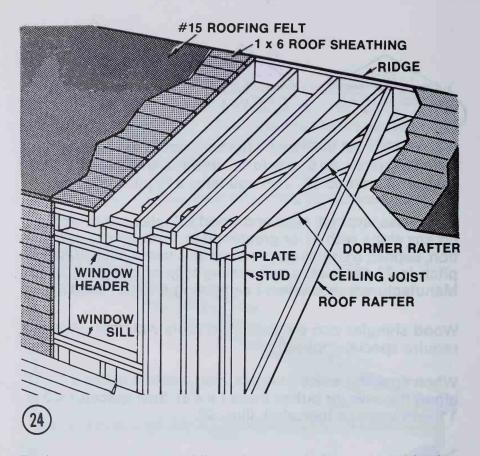
A 6" in 12" roof will rise 6" to each foot of run. This is also called a ¼ pitch. An 8" rise to 12" run is called a ½ pitch. If you have a 12" rise to 12" run, you have a ½ pitch, Illus. 22.

Fiberglass, asphalt, slate and wood shingles can be applied on any slope with 4" or greater pitch. With special application, asphalt shingles can be used on a lesser pitch. Where a pitch is 2" per foot, a self-sealing type of shingle is used. Manufacturers recommend cementing these in position.

Wood shingles can be applied to roofs with less pitch but require special application.

When applying wood shingles, many roofers nailed a 1 \times 10 along the eave (or butted three 1 \times 4's), then spaced 1 \times 3 or 1 \times 4 in position indicated, Illus. 23.





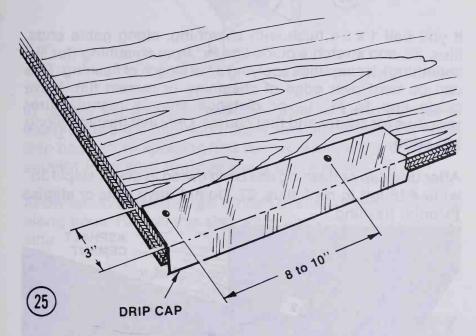
Project starter course of fiberglass, asphalt or wood shingles 3/4 to 1" over fascia.

When fiberglass, asphalt, asbestos, slate or tile roofing is to be applied, the roof is sheathed with solid sheathing. Older houses were sheated with 1 x 6, Illus. 24.

Depending on local codes and/or FHA requirements, ½, % or ¾'' plywood is nailed to rafters. Stagger all end joints so no butting ends are nailed to same rafter.

NEW CONSTRUCTION

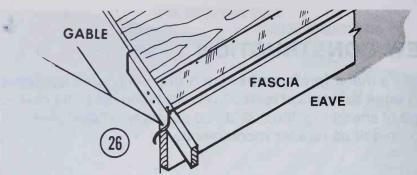
Apply a metal (preferably copper) drip edge to eaves. Bend drip edge so it lays at least 3" on roof along eave and covers edge of sheathing, Illus. 25. If you purchase a fabricated drip cap, install as retailer recommends.



Nail to sheathing along top edge every 8 to 10".

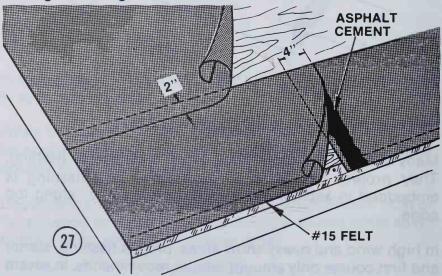
Many builders and roofers use 4 to 6" wide copper flashing. They project this 3/4 to 1" over eave. The flashing is embedded in asphalt and nailed every 8 to 10" along top edge.

In high wind and heavy snow areas, project flashing, starter and first course only amount retailer recommends. In severe weather areas, many recommend installing thermostatically controlled heating cables in gutter prior to the first freezing weather. This helps eliminate ice from building up and raising the flashing, starter and first course.

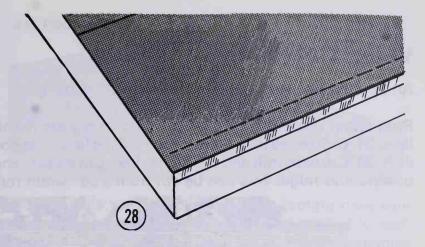


If you nail 1 x 2's flush with sheathing, along gable ends, Illus. 26, and stretch a guide line 5%' from sheathing (for 5%' sheathing), it simplifies applying a flat length of flashing. This can be bent over edge of sheathing or remain flat. Move guide line to 34, 1" or distance shingle manufacturer specifies for starter and first course. Only nail flashing along top edge.

After drip cap or flashing has been nailed in place, staple 36" wide #15 felt to roof, Illus. 27. Do not drive nails or staples through flashing.



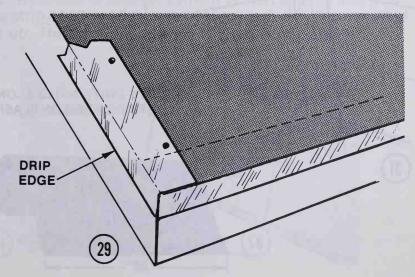
Start at eave and staple or nail felt to roof. Allow next course to overlap first course at least 2". If you have to overlap ends, allow at least a 4" overlap. Embed overlap in asphalt before nailing, Illus. 27. Illus. 28, indicates #15 felt over eave flashing.



In quality construction and especially in areas subject to heavy snows and high wind, apply asphalt cement over metal drip cap before applying first course. Apply a 4 to 6" strip of cement from eave to ridge along gable edge.

Allow felt to overlap ridge. Embed overlap in cement. Staple along edge. Repeat this step when applying felt to opposite side.

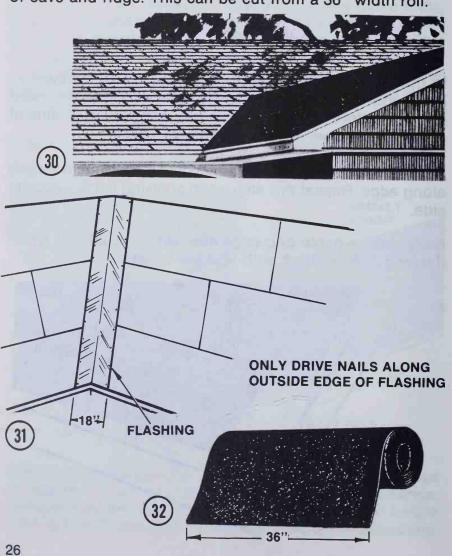
Next apply a gable drip edge over felt, Illus. 29. The gable flashing finishes flush with flashing on eave.

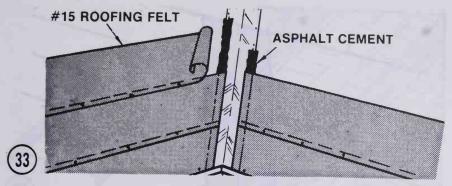


VALLEY FLASHING

An open valley, Illus. 30, requires special handling.

Pros either use one 12, 16 or 18" strip of copper flashing, Illus. 31, or 50 or 90 lb. mineral faced roll roofing, face down, Illus. 32. Cut to length and width required. Cut ends to shape of eave and ridge. This can be cut from a 36" width roll.

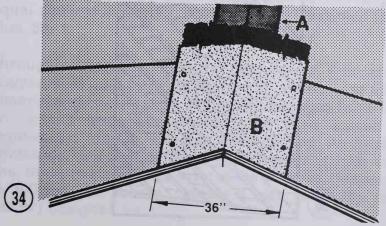


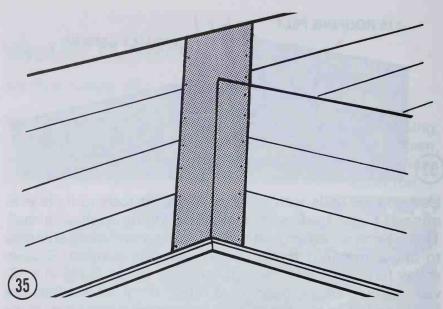


Use copper nails with copper, big head roofing nails with mineral faced roofing. The #15 felt is then applied to roof. This overlaps flashing, Illus. 33. Cut felt and roofing shingles to angle required to expose 6" of metal at ridge. Expose valley flashing 1" for each 8' length of valley. Metal in a 16' valley would be exposed 6" at ridge, 8" at eave. While the felt is nailed or stapled to roof, it overlaps flashing in valley and is bonded to copper with asphalt cement. DO NOT NAIL FELT THROUGH FLASHING.

A less expensive and still serviceable method is to cut an 18" wide strip of 50 or 90 lb. mineral faced roofing. Embed in cement face down in valley, Illus. 34. Nail 1" in from edge.

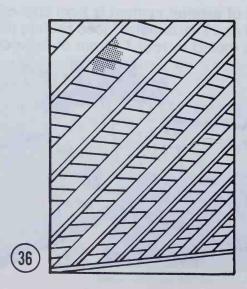
A 36" wide bed of asphalt cement is then applied and a 36" wide strip of 50 or 90 lb. mineral faced roofing is embedded face up. This is nailed to roof 1" from outside edge.

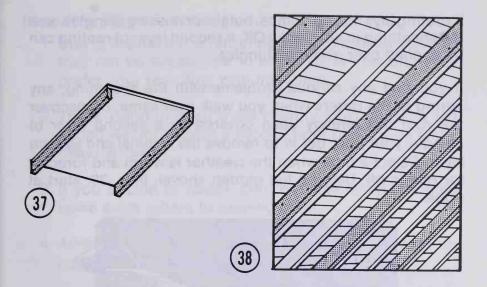




A closed valley, Illus. 35, can be protected with a strip of 50 lb. or heavier roll roofing, nailed only on outside edge. Never nail shingles closer to center of valley than 6", Illus. 31.

Regardless of whether an emergency requires a new roof, or you are reroofing over an existing one, take the time to inspect roof sheathing from inside the attic, Illus. 36.





If you see any water stain, rotted sheathing or rafters, poke a screw driver into every suspected area. Any sheathing that indicates rot should be reinforced prior to starting the roofing job.

Cut a piece of %" plywood, Illus. 37, to overall size needed to butt against adjacent rafters. Nail plywood to two 1 x 3 cut to length required. Use 8 penny nails.

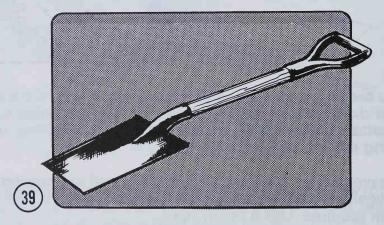
Nail 1 x 3 to rafters with 8 or 10 penny nails.

If you find any rafters that show weakness, cut two lengths of equal dimension lumber. Spike these to weakened rafters, Illus. 38.

Through prosperous times and depressions, thousands of houses were built by fast buck operators who used inferior material and construction. Rafters were spaced 18, 20 to 24" on centers when they should have been spaced 16" Lightweight roofing shingles were applied. As problems developed, new owners would apply a new roof over the old one, never realizing the weight of the shingles, between 200 to 300 lbs. per square, created a load factor the rafters weren't designed for.

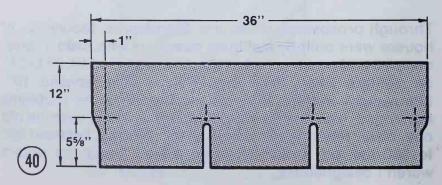
If roofing lays flat, no humps, bulges or missing shingles, and the sheathing in attic looks OK, a second layer of roofing can be applied over existing shingles.

If you find any serious problems with the sheathing, any spring in the rafters when you walk over same, or discover the roof has already been covered by a second layer of shingle, your best bet is to remove the original and second layer. Select a time when the weather is warm and forecast for rain is nil. Using a flat garden shovel, Illus. 39, start at ridge.



Carefully pry up shingles on ridge and work your way down to eave. Use care not to disturb the #15 felt. If exposed felt is dried out, apply a second layer of #15 felt over existing one.

Most 36" asphalt shingles are nailed with four big head 11/4 to 11/2" roofing nails in position shown, Illus. 40.



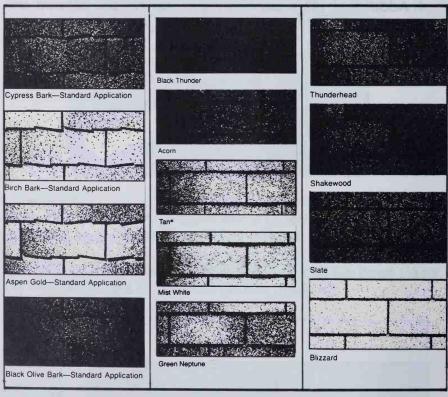
Important points to consider:

- Due to fire hazard, a reroofing job with asphalt shingles may not be acceptable to some home insurers. They prefer your reroofing with fiberglass.
- 2. Those living in deep snow country must consider the added weight of both a second layer of shingles and a heavy snowfall.
- 3. If you decide to reroof, consider whether you should spike extra rafters to existing ones.
- Additional facts concerning reroofing are offered on page 112 to 114.



FIBER GLASS AND ASPHALT SHINGLES

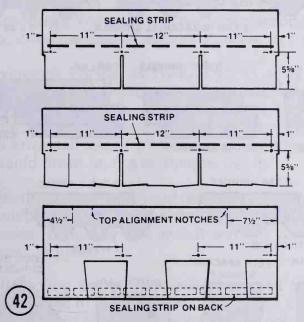
Fiber glass is one of the newest entries in roofing products. They come in a wide variety of colors and shapes, Illus. 41. Since they bear an Underwriters Laboratory Class A fire resistant rating (the highest standard), when applying a new roof or reroofing, give serious consideration to paying their slightly higher cost.





Besides being far more resistant to fire and rot, the ceramic coated granules provide years of carefree service when installed exactly as manufacturer specifies.

After applying eave and gable flashing or drip cap and #15 felt as previously described, draw a vertical center line down roof from eave to ridge, Illus. 45. Apply each fiber glass shingle with four nails per shingle, Illus. 42, as per asphalt shingle.

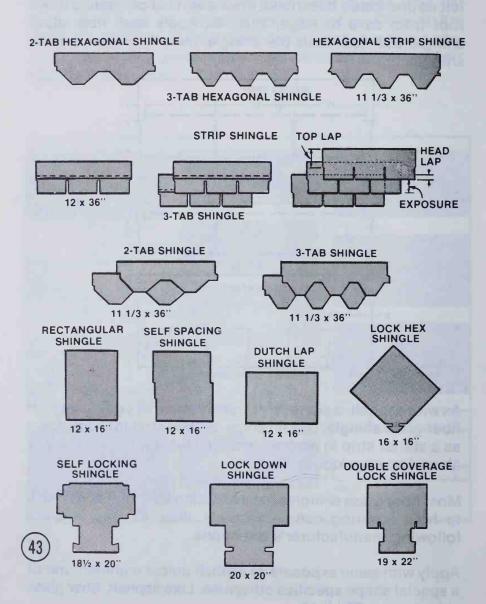


As with asphalt, a starter strip can be made by cutting tabs off fiber glass shingle. Use tin snips. Embed straight edge down as a starter strip in asphalt cement, Illus. 45. Drive nails only along top edge above flashing.

Most fiber glass shingles have a sealing strip that does much to hold covering course securely, Illus. 42. Tap in place following manufacturer's directions.

Apply with same exposure as asphalt unless manufacturer of a special shape specifies otherwise. Like asphalt, fiber glass shingles are 36" long.

Asphalt shingles come in a variety of shapes and widths, Illus.
43. While each manufacturer recommends exposure, most are laid with a 5" exposure. Asphalt shingles are 36" long by 11" to 12" in width. The double coverage lock shingle is 22" long, 19" in width.



Through the years, manufacturers continually created new shapes and colors. For this reason, some types of replacement shingles may be difficult to find.

When repairs are required, always buy the same overall size and weight. If you can't take a full sample to your dealer, take a small piece plus overall dimension so he can match up weight and size.

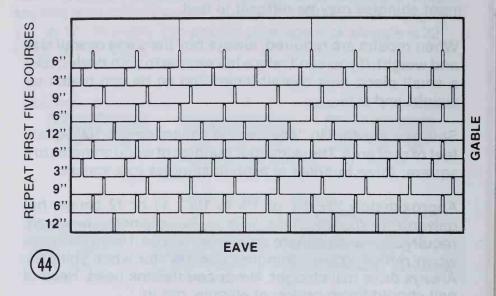
Shingles are sold in "squares." A square covers 100 square feet of roof area. There are four bundles of wood shingles to a square; three bundles of asphalt shingles to a square.

Approximately 2½ lbs. of 1¼ to 1½", 11 or 12 gauge, hot galvanized roofing nails with a ¾" diameter head are required for each square on new work. Use 1½ or 1¾" nails when reroofing over shingles. Use 1¾" for wood shingles. Always drive nail straight. Never countersink head. Head of nail should finish on top of shingle, not in.

To estimate square foot area of roof, measure length of rafter and multiply by length of building; multiply by two to cover both sides. Divide by 100 and it will tell you number of "squares" required.

Asphalt roofing cement is made of asphalt and asbestos fibers. It comes in 5 gallon cans. A 5 gallon can will cover approximately 60 square feet when applied not more than 1/8" thick. The best time to apply asphalt cement is during the summer. Asphalt congeals in cold weather. Use asphalt cement to cover nailheads and to lock down shingles where extra fastening is required, over eave and gable flashing, valleys, chimneys, dormer, etc.

Asphalt and fiber glass shingles can be nailed with four nails per shingle, Illus. 42. Drive first nail 1" from edge, 5%" up from bottom edge as shown. Work from left to right, or right to left, but don't drive nails in both outer edges, then through middle. Working from one end eliminates possibility of buckling the shingle.



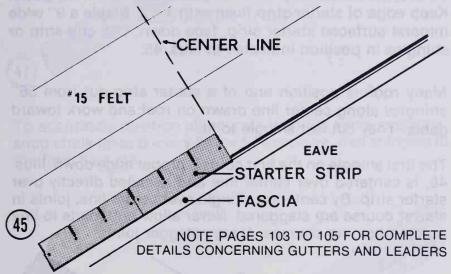
To make certain butt joints on adjacent courses are staggered proper distance, follow pattern shown, Illus. 44.

Shingles are applied with a specified "exposure." Exposure refers to the amount of shingle exposed to weather, note B, Illus. 23. The amount of exposure is determined by pitch of roof and kind of shingle. Shingle manufacturers specify both exposure as well as directions for nailing.

Wood shingles are manufactured in three lengths — 16", 18", 24". 16" wood shingles are usually laid with a 5" exposure; 18" with a $5\frac{1}{2}$ "; 24" with a $7\frac{1}{2}$ ". This exposure applies to roof with a pitch of at least 5" in 12". If roof is less than 5", a 16" shingle should be laid with $3\frac{3}{4}$ " exposure; and 18" with approximately $4\frac{3}{4}$ " exposure; a 24" with $5\frac{3}{4}$ ".

WHERE TO START

After eave drip cap or flashing, #15 felt and gable flashing have been nailed in position, apply asphalt cement and nail starter strip, Illus. 45, in position. Be sure nails are driven above edge of eave flashing, not through. Some manufacturers sell starting strips. If you have to cut shingles, measure overall length of roof and divide by 3'. This will give you exact number of 36'' shingles that need to be cut.



Position starter strip so it projects ½,¾,1" or amount shingle manufacturer specifies over eave flashing.

Measure and snap a center line, also lines to indicate top of each course.

One bundle of 12 x 36" asphalt shingles, Illus. 43, provides 93 lineal feet of starter strip.

9" strips, cut from 90 lb. roll roofing, Illus. 33, can be used face down as a starter strip. A 36" roll contains 36 lineal feet. It provides 72 feet when cut into 18" strips; 108 lineal feet of 12" wide strips; 144 lineal feet of 9" strips.

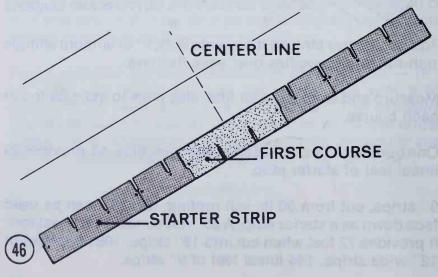
A starter strip, Illus. 45, projects over edge of eave ½, ¾ or 1". This insures rain running into gutter. Project starter strip % or ¾" over gable. Note amount of projection previously used and position starter strips accordingly. Roofers frequently project wood shingles as much as ¾ or 1" over edge, Illus. 23.

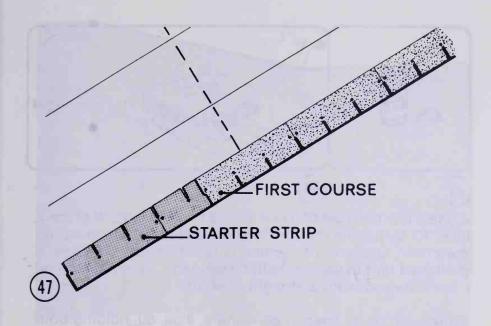
To insure nailing starter strip along a straight line, nail a 1×2 to each end of roof, Illus. 26. Stretch a line at distance required, Illus. 26.

To project starter strip ¾'' over gable, tack a 1 x 2 to gable. Keep edge of starter strip flush with 1 x 2. Staple a 9'' wide mineral surfaced starter strip, face down. Use one strip or shingles in position indicated in Illus. 45.

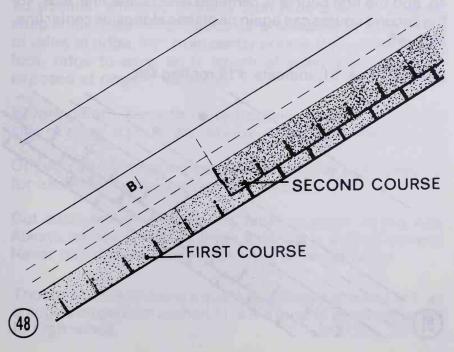
Many roofers position end of a starter strip cut from 36" shingles along center line drawn on roof and work toward gable. They cut last shingle to fit.

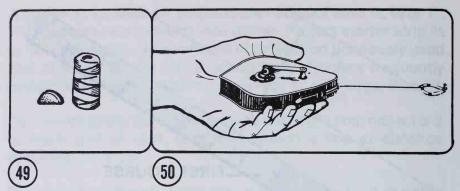
The first shingle on the first course, proper edge down, Illus. 46, is centered over center line and is nailed directly over starter strip. By centering shingle over center line, joints in starter course are staggered. Never allow butt joints to line up on adjoining courses. Always stagger joints.





To accurately position all courses with the same exposure, snap chalk lines B every 5" for 5" exposure. Nail shingles to the line, Illus. 48.



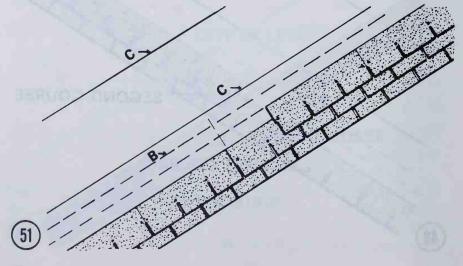


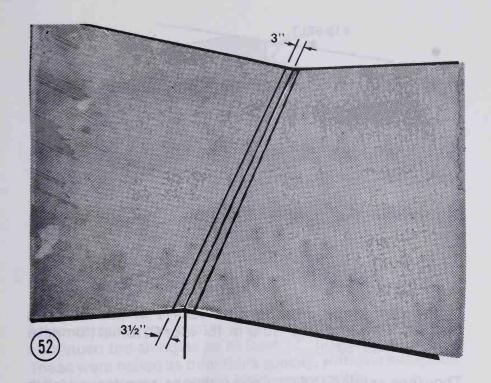
A chalk line consists of piece of blue chalk and a ball of cord, Illus. 49. By pulling the cord over the chalk, the cord picks up the chalk. One end of the line is tied to a nail. The line is stretched taut in exact position required. Snapping the line marks the roof with a straight blue line.

Stores sell chalk lines in containers, Illus. 50, holding both the line and powdered chalk.

When the starter strip is placed alongside center line, Illus. 45, and the first course is centered over center line, Illus. 46, the second course can again be placed alongside center line, Illus. 48.

Lines C, Illus. 51, indicate #15 roofing felt.





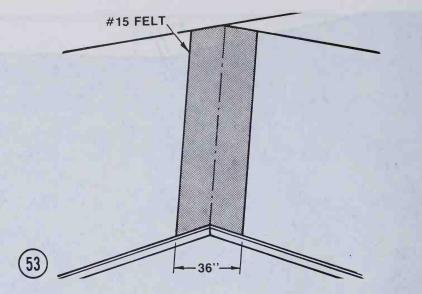
To position shingles properly alongside a valley, Illus. 52, snap chalk lines from ridge to eave. Measure 3" from center of valley at ridge, 3½" from center at eave. If you allow ½" per foot, ridge to eave, an 8' length of valley would show 6" exposed at ridge, 7" at eave.

Before getting close to valley flashing, measure 3" to each side of valley at ridge; 31/2" at eave. Snap chalk lines, Illus. 52.

Or you can estimate exposed width of valley by figuring 1/8'' for each foot between ridge and eave.

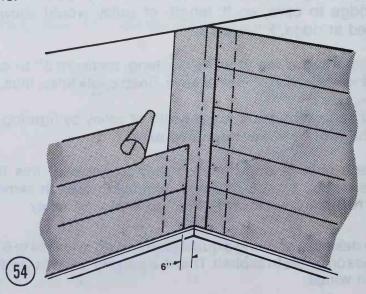
Cut each shingle adjacent to valley to angle of this line. Always embed 6" end of these shingles in asphalt cement. Never nail shingle closer than 6" to center of valley.

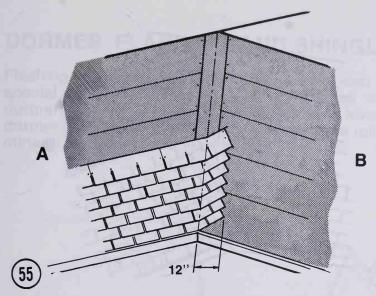
Those desirous of doing a quality job embed at least 4 to 6" of shingles on gable in asphalt. This is a must in areas subjected to high winds.



In the past many pros handled valleys in the following manner. They laid a 36" strip of 15, 45 or 50 lb. felt from eave to ridge, Illus. 53.

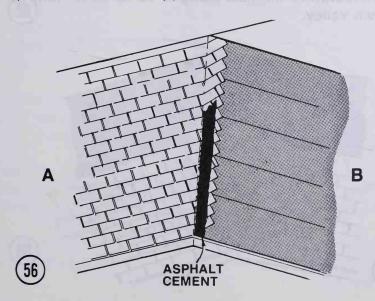
They then applied #15 felt horizontally so it overlapped felt in valley to within 6" of center, Illus. 54. They used as few nails as possible since the felt would be held in place by shingle nails.

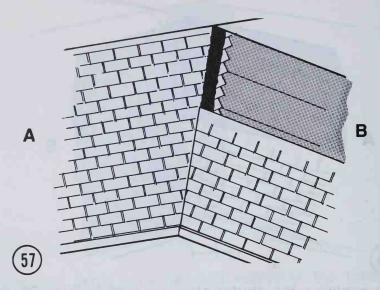




After applying the starter strip on roof A, Illus. 55, they continued the shingles so at least 12" projected on roof B. These were nailed as directions specify, with one exception. An extra nail was added to hold corner at top.

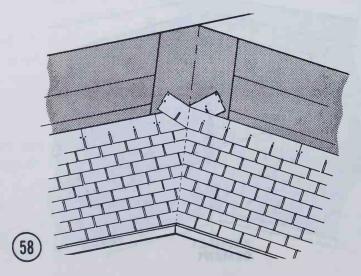
Prior to laying shingles on roof B, a 3 to 6" wide band of asphalt cement was applied, Illus. 56.





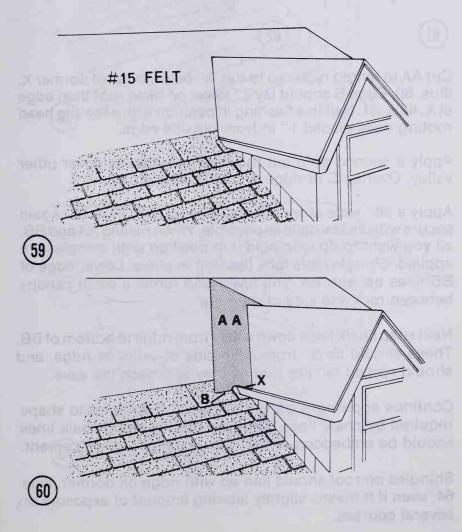
Shingles applied to roof B were cut (use tin snips) to angle of valley, pressed into asphalt and nailed as directions specify, Illus. 57.

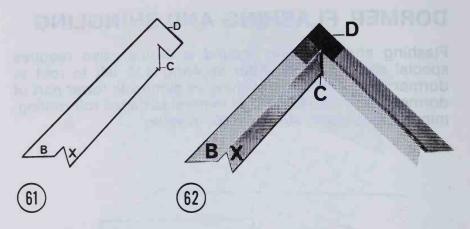
Many roofers applied shingles in a woven pattern, Illus. 58. Never nail closer than 6" from center of valley. In this application manufacturers suggest using a 55 to 90 lb. felt, 36" wide down valley.



DORMER FLASHING AND SHINGLING

Flashing and shingling around a dormer also requires special care, Illus. 59. After applying #15 felt to roof of dormer; step flashing and shingles alongside lower part of dormer, apply an 18" strip of mineral surfaced roll roofing, mineral face down, AA, Illus. 60, in valley.





Cut AA to length required to run 1/4" below edge of dormer X, Illus. 60. Edge B should lay 2" lower on main roof than edge at X, Illus. 61. Nail this flashing in position with a few big head roofing nails placed 1" in from outside edge.

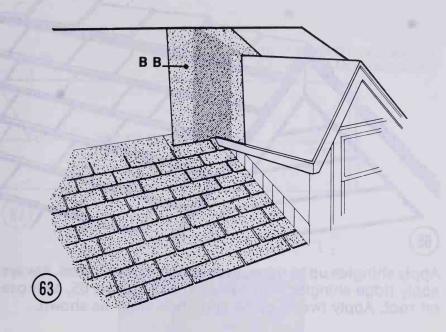
Apply a second strip cut to shape required to cover other valley. Overlap C at ridge and at D, Illus. 61,62.

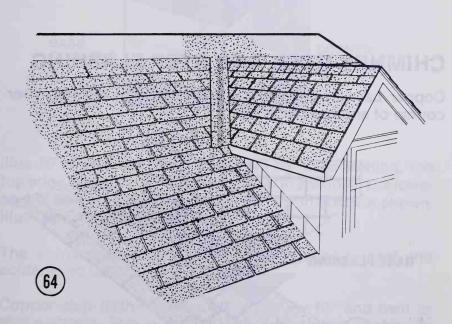
Apply a 36" wide strip, mineral face up, BB, Illus. 63. Again secure with as few nails as possible. When nailing AA and BB, all you want to do is to hold it in position until shingles are applied. Shingle nails lock flashing in place. Lower edge of BB lines up with AA. The lower end forms a small canopy between roof and side of dormer.

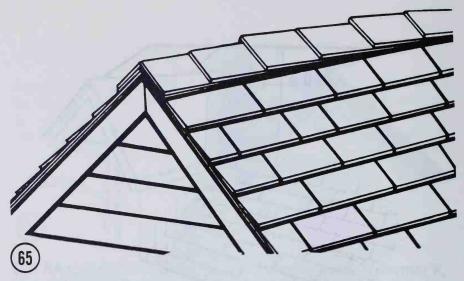
Next snap chalk lines down valley from ridge to bottom of BB. These should be 3" from each side of valley at ridge, and should spread 1/8" per foot as they approach the eave.

Continue applying roofing shingles. Cut shingles to shape required by chalk lines. Shingles butting along chalk lines should be embedded in a 3" wide strip of asphalt cement.

Shingles on roof should line up with ridge on dormer, Illus. 64, even if it means slightly altering amount of exposure on several courses.



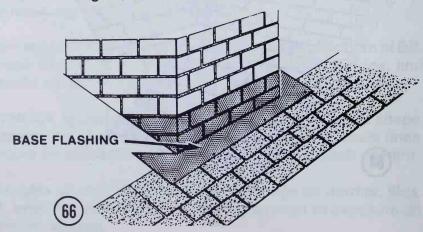


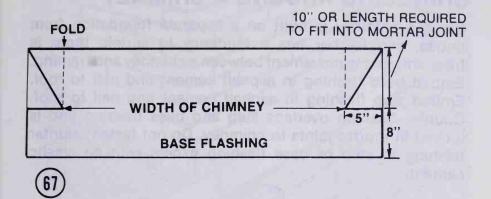


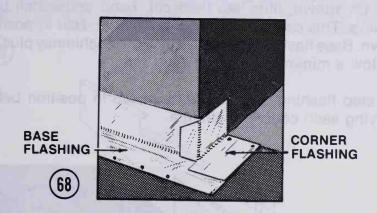
Apply shingles up to ridge, then apply ridge shingles. Always apply ridge shingles with same exposure, Illus. 65, as those on roof. Apply two at gable end, then apply as shown.

CHIMNEY BASE AND STEP FLASHING

Copper base flashing is applied at base of chimney over course of shingles, Illus. 66.







Illus. 67 shows how to cut base from 18" wide flashing. The top edge is bent ½" to fit in mortar joint in chimney. The lower part is bent to pitch of roof. Nail to roof in position shown, Illus. 68.

The corner step flashing, Illus. 68, is nailed to roof and soldered to base.

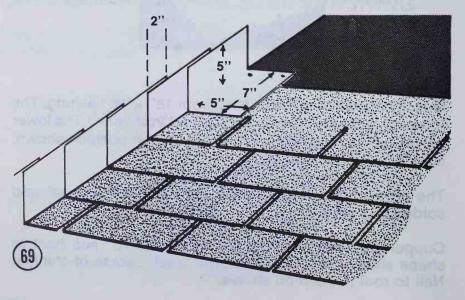
Copper step flashing, Illus. 69, is cut 7×10 " and bent to shape shown. This is applied with each course of shingle. Nail to roof in position shown.

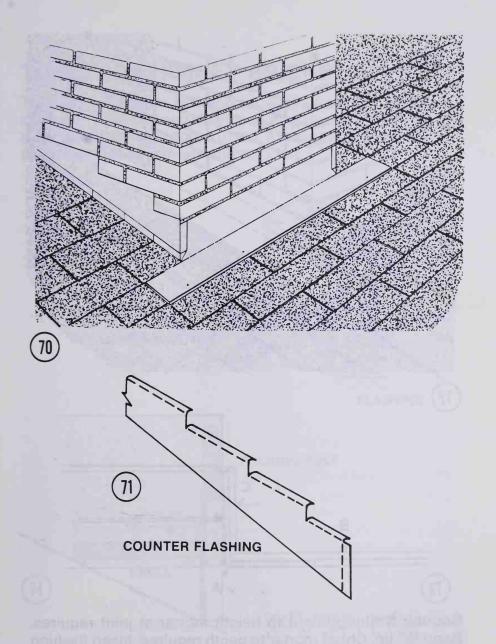
SHINGLING AROUND A CHIMNEY

Since a chimney is built on a separate foundation from house, and lumber has a tendency to shrink, there is frequently some movement between a chimney and framing. Embed base flashing in asphalt cement and nail to roof. Embed step flashing in asphalt cement and nail to roof. Counter flashing overlaps step and base flashing and is locked in mortar joints to chimney. Do not fasten counter flashing to step or base flashing except with an elastic cement.

When shingling around a chimney, apply a course up to position shown, Illus. 66, then cut, bend and install base flashing. This can be copper or aluminum. Nail in position shown. Base flashing is usually cut width of chimney plus 10" to allow a minimum of 5" on each side.

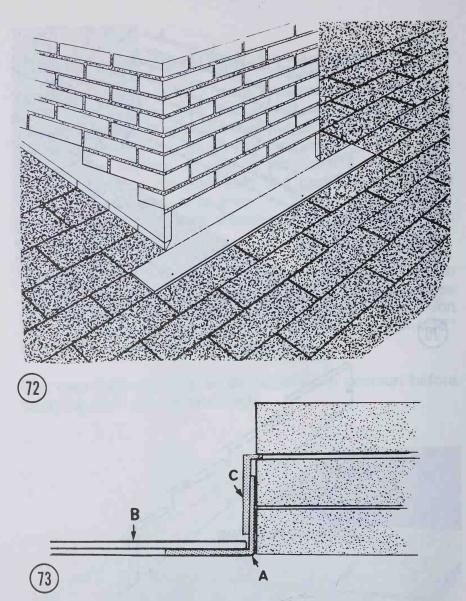
The step flashing, Illus. 68,69, is nailed in position before applying each course of shingle.





Step flashing overlaps 2" on vertical joints, Illus. 69,70.

Counter flashing, Illus. 71, is cut to length and shape required. The top edge is bent and is embedded in mortar joint while the bottom edge overlaps step flashing.

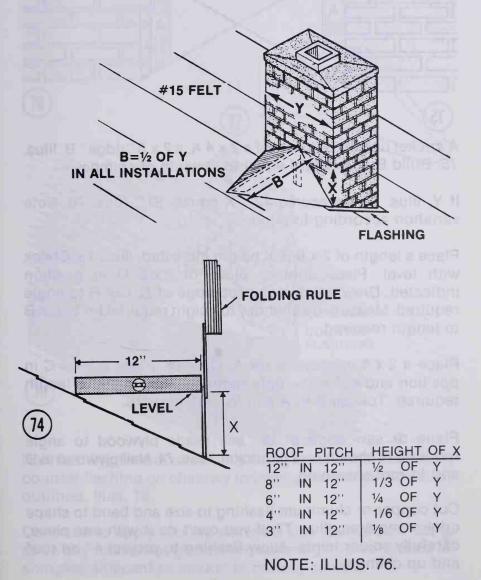


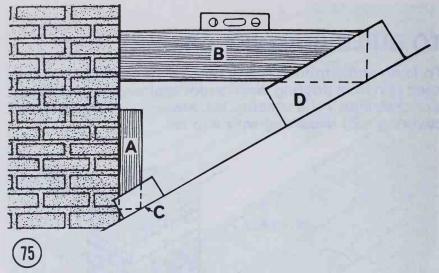
Counter flashing is cut to height mortar at joint requires. Bend ½" lip. Chisel mortar to depth required. Insert flashing then grout mortar joint, Illus. 71,72. Use premixed brick mortar.

Illus. 73 indicates step flashing A, shingle B, counter flashing C.

TO BUILD CHIMNEY CRICKET

To keep snow from building up against a chimney, and to keep rain from pouring down a roof against side of chimney, a cricket, Illus. 74, is constructed. Always build a cricket after covering roof sheathing with #15 felt.





A cricket usually consists of a 2 x 4 A, a 2 x 6 "ridge" B, Illus. 75. Build B at a height equal to ½ width of chimney.

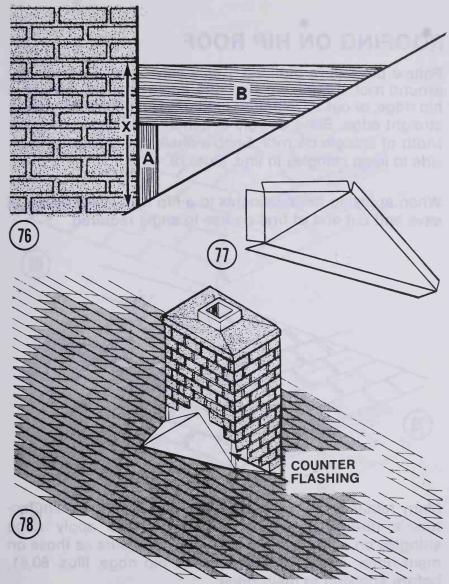
If Y, Illus. 74, measures 42", X equals 21", Illus. 76. Note variation according to pitch.

Place a length of 2 x 6 B at height indicated, Illus. 75. Check with level. Place another piece of 2 x 6 D in position indicated. Draw a line along top edge of D. Cut B to angle required. Measure up chimney to height required for B; cut B to length required.

Place a 2 x 4 in position for A, Illus. 75. Place a 2 x 4 C in position and cut A to angle required. Next cut A to length required. Toenail B to A and to roof, Illus. 76.

Plane or saw edge of ½" ext. grade plywood to angle required to sheath roof of cricket, Illus. 74. Nail plywood to B and to roof sheathing.

Cut copper or aluminum flashing to size and bend to shape cricket requires, Illus. 77. If you can't do it with one piece, carefully solder joints. Allow flashing to project 4" on roof and up chimney.



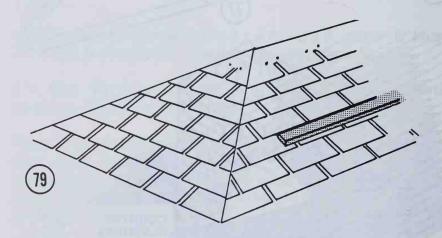
Nail flashing to roof sheathing along outer edge, then apply counter flashing on chimney following directions previously outlined, Illus. 78.

Continue to apply roofing shingles. Use special care not to drive any nails through flashing covering cricket. Embed all shingles adjacent to cricket in roofing cement.

ROOFING ON HIP ROOF

Follow procedure outlined. Apply each course completely around roof. If same are available, apply ridge shingles on a hip ridge, or cut 36" shingles in thirds. Cut off tabs to make a straight edge. Bend shingle in center over ridge and mark width of shingle on roof. Snap a chalk line alongside each side to keep shingles in line, Illus. 79.

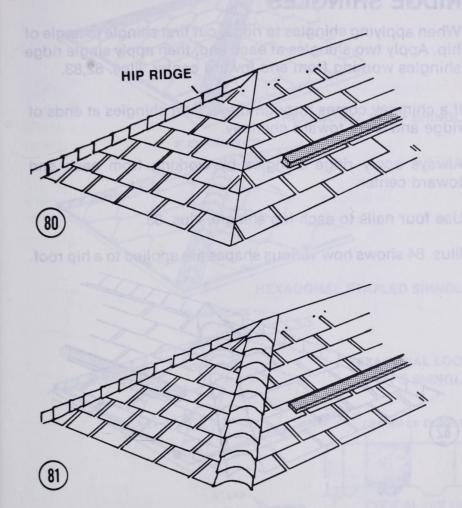
When applying ridge shingles to a hip roof, always start at eave and cut end of first course to angle required.



Many retailers sell ridge shingles. Apply same as manufacturer's directions specify. Roofers always apply ridge shingles on a hip roof with the same exposure as those on main ridge. Apply ridge shingles to hip ridge, Illus. 80,81, before applying to main ridge.

Nail hip ridge in position on one side. Bend over ridge and nail to other side.

Don't attempt this job on a cold day, or when the temperature is so high that it loosens mineral coating on shingles.



RIDGE SHINGLES

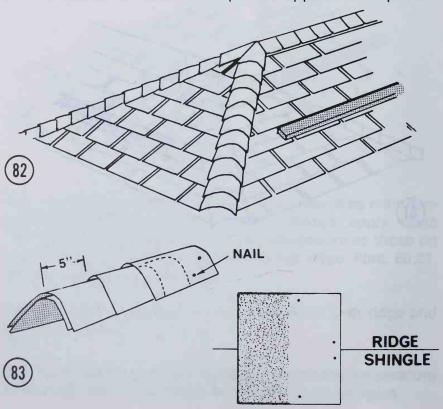
When applying shingles to ridge, cut first shingle to angle of hip. Apply two shingles at each end, then apply single ridge shingles working from end toward center, Illus. 82,83.

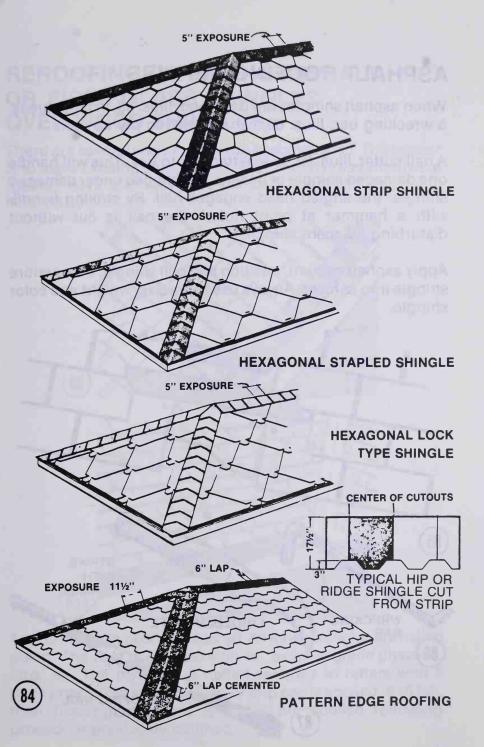
If a chimney comes through ridge, start shingles at ends of ridge and work toward chimney.

Always apply ridge shingles by working from each end toward center.

Use four nails to each hip shingle, Illus. 83.

Illus. 84 shows how various shapes are applied to a hip roof.



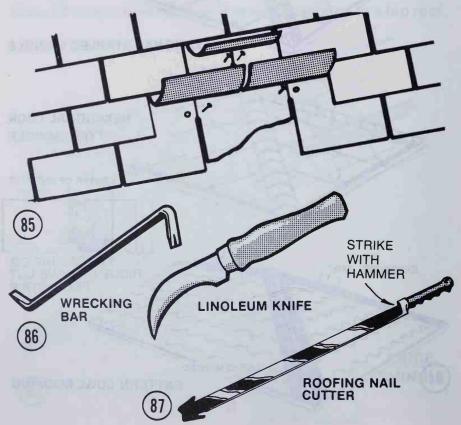


ASPHALT ROOFING REPAIRS

When asphalt shingles are damaged, Illus. 85, in large areas, a wrecking bar, Illus. 86, can be used to pry up nails.

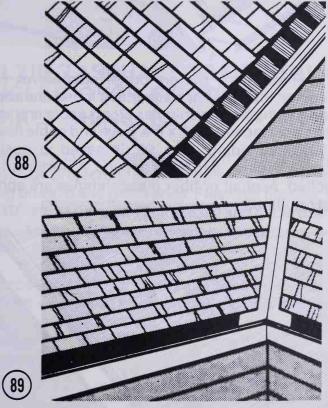
A nail cutter, Illus. 87, is a better tool to use. This will handle one damaged shingle or dozens. It is slipped under damaged shingle, the angled head engages nail. By striking handle with a hammer at point noted, the nail is cut without disturbing adjacent shingles.

Apply asphalt cement, position and nail shingle. Press entire shingle into cement. Always use same size, weight and color shingle.

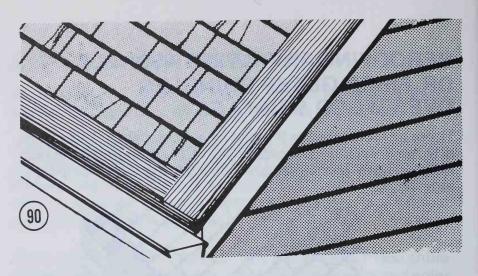


REROOFING - APPLYING ASPHALT OR FIBER GLASS SHINGLES OVER WOOD SHINGLES

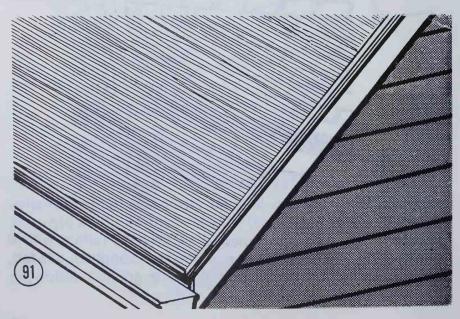
There are several ways this can be accomplished. The easiest is to leave existing shingles in place. The shingles along rake (gable), eave and valley are cut back the width of a 1×6 , Illus. 88,99.

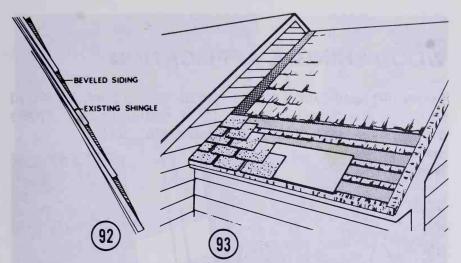


1 x 6 is nailed in positon, Illus. 90. All loose shingles are nailed down. The roof is covered with 36" exterior grade plywood, Illus. 91. The plywood is nailed securely to rafters with 8 penny nails. The eave flashing or drip cap is applied, #15 felt, then flashing on gable. Shingles are applied following procedure previously outlined.



Another method many roofers prefer also leaves existing wood shingles intact. After nailing any loose and replacing any missing shingles, the shingles along gable and eave are cut back and replaced with 1 x 6's. Eave and gable flashing is applied. Beveled siding, Illus. 92, is nailed in position to feather out butt joints. #15 felt is applied. A starter strip, Illus. 93, is applied. Asphalt or fiber glass shingles are applied as previously outlined.

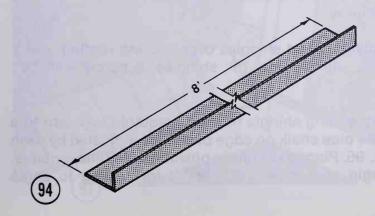




APPLYING ASPHALT OR FIBER GLASS SHINGLES OVER EXISTING ASPHALT SHINGLES

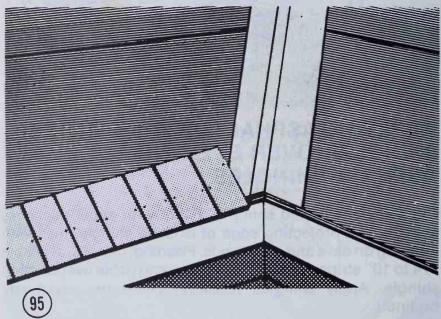
Cut away any curled shingles. Fill in with equal thickness shingle. Cut projecting edge of existing shingle flush with molding on eave and gable ends. Flashing, Illus. 93, available in 4 to 10" strips, is nailed along eave and gable over existing shingle. Apply shingles following procedure previously outlined.

Some pros use 1 x 2" x 8" heavy gauge aluminum, Illus. 94, to cover eave and gable prior to applying new shingles.



WOOD SHINGLE APPLICATION

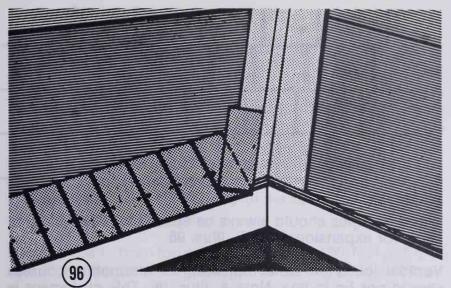
Following application of #15 felt and valley flashing, wood shingles are nailed in place for a starter course. These project over edge of eave and gable, Illus. 95,23.



On many houses wood shingles are nailed to 1 x 3 or 1 x 4 shingle lathe, Illus. 23. These are spaced and nailed to rafters with 10 penny nails in position shown. #15 roofing felt is stapled to lathe.

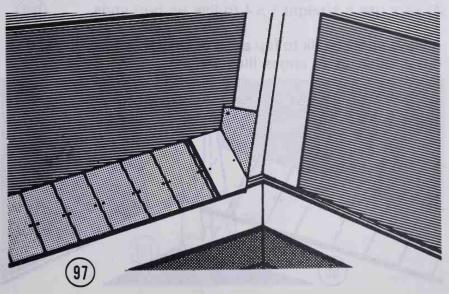
When applying wood shingles over existing roofing, use 5 penny nails with 16 and 18" shingles; 6 penny with 24" shingles.

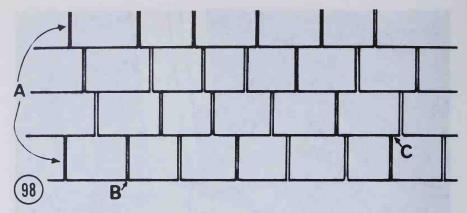
To simplify cutting shingle to shape required adjacent to a valley, draw blue chalk on edge of shingle indicated by dash line, Illus. 96. Place a shingle in position valley line requires. Slap shingle and chalk will mark it for cutting to angle required.



Use care not to drive nails through flashing. When skilled roofers do a quality job, they embed shingles alongside a valley in asphalt roofing cement.

Cut lower corner off shingle when applying first course, Illus. 97. The first course is laid over starter course. Stagger vertical joints so none are less than 1½" apart. Note C, Illus. 98.





Wood shingles should always be spaced with 1/4" joints to allow for expansion. Note B, Illus. 98.

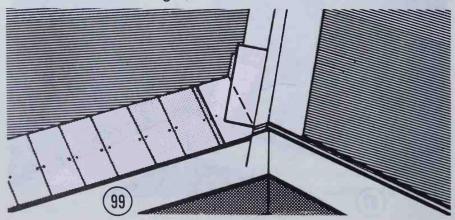
Vertical joints on either adjoining or alternating courses should not be in line. Note A, Illus. 98. This placement is correct.

Always nail wood shingles with two nails spaced about 3/4" from side, and in position shown, Illus. 99. Use small headed hot zinc dip or aluminum nails.

Always snap chalk lines to indicate top edge of a course.

Always use a straight 1 x 4 to line up butt ends.

Always apply chalk to top edge of shingle when you need to cut another at an angle, Illus. 99.

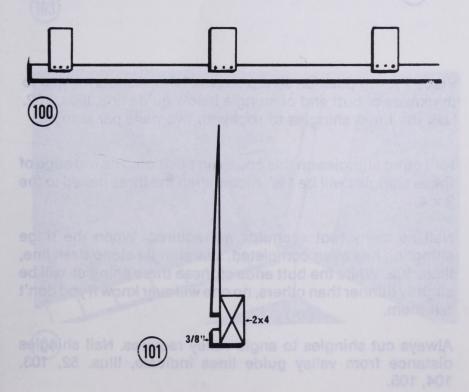


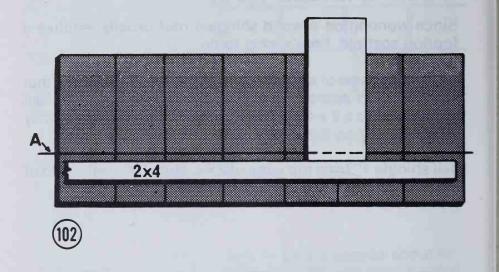
FOOTING SCAFFOLD — WOOD SHINGLE ROOF

Since working on a wood shingled roof usually requires a footing scaffold, here's what to do.

Lay out a course of shingle along guide line. Select three that are placed in approximate position shown, Illus. 100. Nail these three to a 2 x 4 x 14 or 16' in the same position as they were laid out on the roof.

Nail shingle 1" from top edge of 2 x 4, Illus. 100. Nail a strip of 3/8 x 1" by length of 2 x 4 along bottom edge, illus. 101.



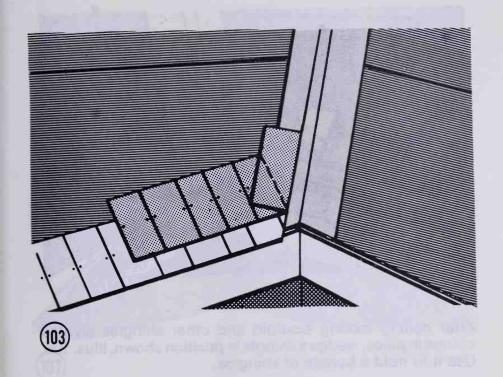


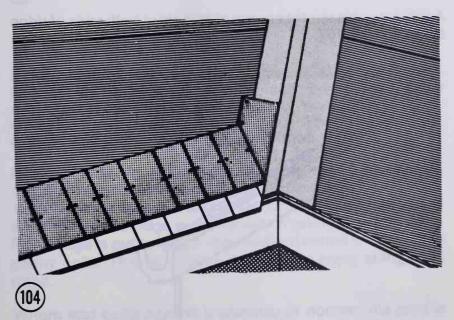
Place 2 x 4 in position so top edge is %", or amount equal to thickness of butt end of shingle below guide line, Illus. 102. Nail the three shingles to roof with two nails per shingle.

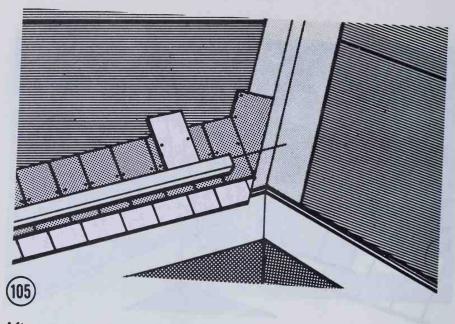
Nail other shingles on this course in position. The top edge of these shingles will be 1%' higher than the three nailed to the 2×4 .

Nail as many foot scaffolds as required. When the ridge shingling has been completed, saw shingle along dash line, Illus. 102. While the butt ends of these three shingles will be slightly thinner than others, no one will ever know if you don't tell them.

Always cut shingles to angle valley requires. Nail shingles distance from valley guide lines indicate, Illus. 52, 103, 104, 105.

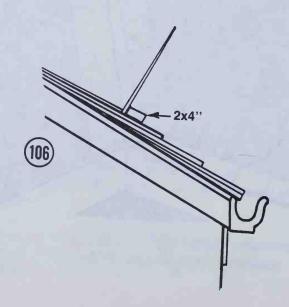


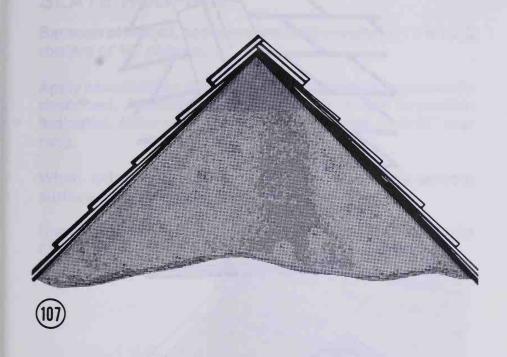




After nailing footing scaffold and other shingles on that course in place, wedge a shingle in position shown, Illus. 106. Use it to hold a bundle of shingles.

Apply a double starter course of shingle at both ends of ridge at rake, Illus. 107.

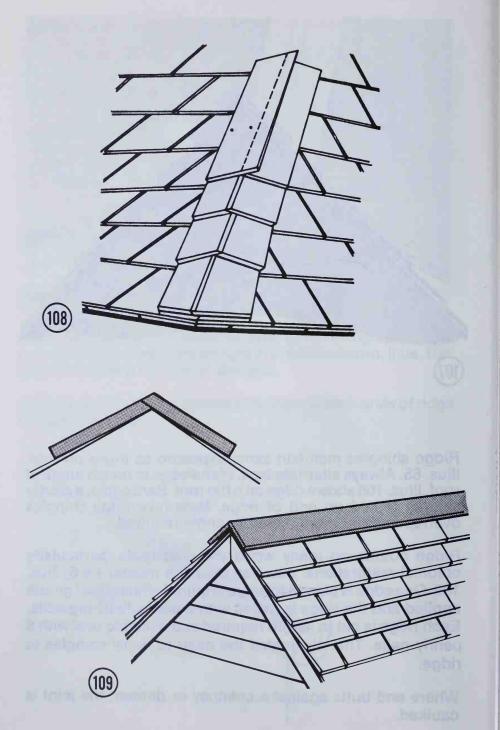




Ridge shingles maintain same exposure as those on roof, Illus. 65. Always alternate laps. Plane edge to match angle of roof. Illus. 108 shows ridge on a hip roof. Here again, a starter shingle is laid on end of ridge. Note how ridge shingles overlap and are then planed to angle required.

Ridge boards on many wood shingled roofs, particularly colonial restorations, now use pressure treated 1 x 6, Illus. 109. One edge is planed to angle required. Waterproof glue is applied and the ridge is nailed with 8 penny finishing nails. Each ridge is cut to length required and nailed to roof with 8 penny nails. This eliminates the need to apply shingles to ridge.

Where end butts against a chimney or dormer, the joint is caulked.



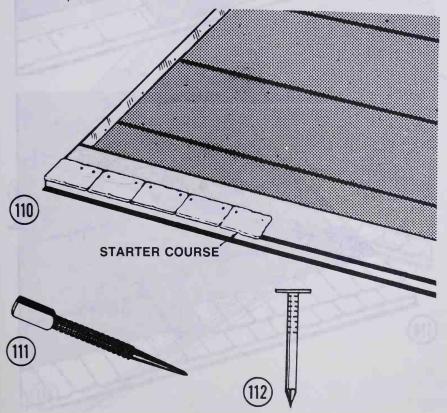
SLATE ROOFING

Because of weight, codes require solid sheathing, 1 x 6 T & G roofers or 3/4" plywood.

Apply eave flashing,#15 felt and gable flashing as previously described. A starter course, Illus. 110, is laid in position indicated. Allow edge to project 1" over eave, ½ to ¾" over rake.

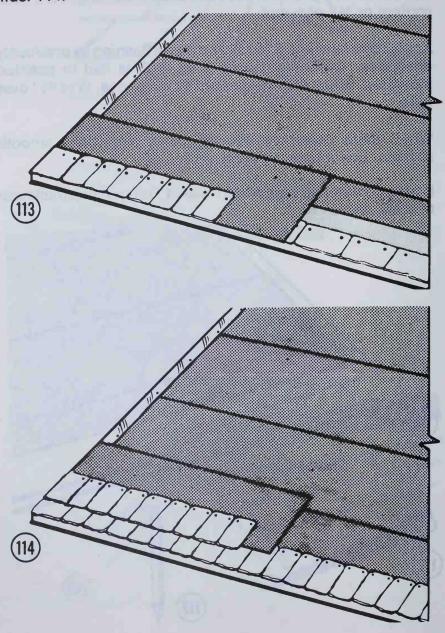
When extra holes are needed, place slate on a smooth surface. Use a center punch, Illus. 111.

Use large flathead copper wire nails 1" longer than thickness of slate, Illus. 112.



To cushion slate, the starter course is covered with an 18" wide strip of #15 felt, Illus. 113. Staple felt to roof.

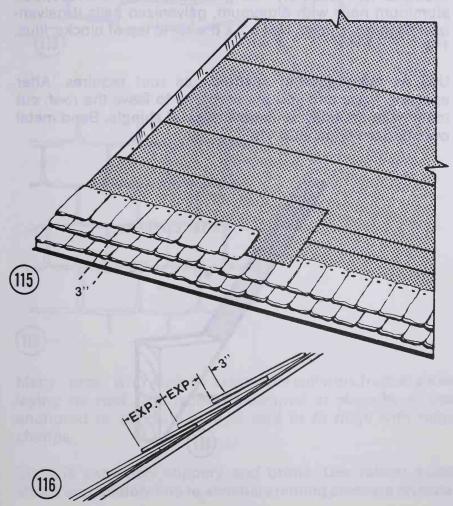
#15 felt is laid between each course in position shown, Illus, 114.



Vertical joints on adjoining courses should not be closer than 3", Illus. 114,115.

Courses can lap as little as 2" over top of adjoining course on a steep roof. Courses should lap 4" if rise is 4" to 6" per foot. Courses can lap 3" if rise is 8" to 12" per foot.

Illus. 116 indicates lap and exposure. If you use 9 x 18" slate, and lap it 3" as shown, to estimate exposure, divide balance of shingle by 2. If you use a 20" shingle and lap it 3" on a steep roof, subtract 3" from length of shingle, divide by 2 equals 8½" exposure.

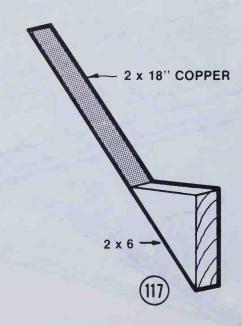


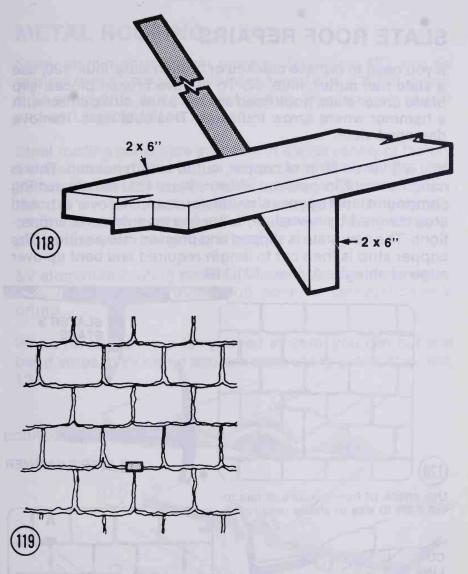
FOOTING SCAFFOLD — SLATE ROOF

Footing scaffolds for a slate roof are required. These can be made using 2 x 18 or 20" strips of copper or aluminum flashing. Nail to 2 x 6 blocks cut to angle pitch of roof requires, Illus. 117.

Securely nail strip to 2 x 6. Nail top end to roof in position that permits laying a course of slate. Use three strips to a 16' scaffold. Nail securely using copper nails with copper, aluminum nails with aluminum, galvanized nails if galvanized flashing is used. Nail a 2 x 6 x 16' to top of blocks, Illus. 118.

Use as many footing scaffolds as roof requires. After applying ridge and you are prepared to leave the roof, cut metal with tin snips 3/4" below edge of shingle. Bend metal over bottom edge, Illus.119.





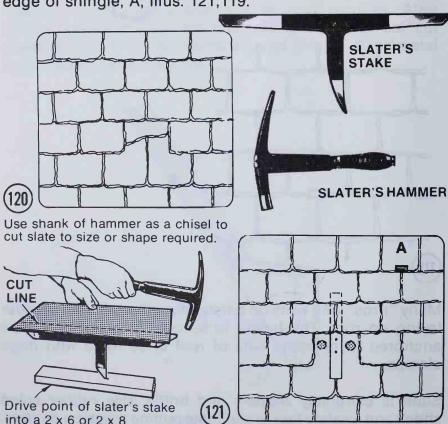
Many "pros" who work on a slate roof will work from a ladder laying on roof. The ladder is secured in place by a rope anchored to opposite side of roof or to ridge with ridge clamps.

Slate is extremely slippery and brittle. Use rubber soled shoes and a safety line to eliminate putting pressure on slate.

SLATE ROOF REPAIRS

If you need to replace cracked or broken slate, Illus. 120, use a slate nail cutter, Illus. 87. To remove broken pieces, slip blade under slate, hook head around a nail, strike cutter with a hammer where arrow indicates. This cuts nails. Remove damaged slate.

Nail a 2" wide strip of copper, cut to length needed. This is nailed to roof in position shown, Illus. 121. Elastic sealing compound, sold by your slate dealer, is applied over exposed area covered by new slate, following manufacturer's directions. The new slate is slipped and pressed into position. The copper strip is then cut to length required and bent up over edge of shingle, A, Illus. 121,119.



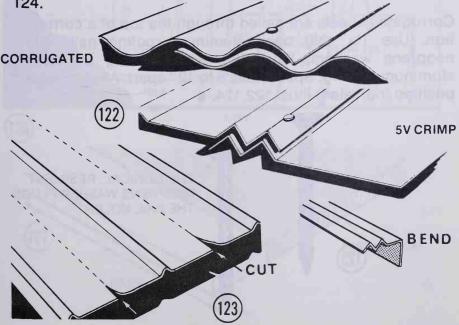
METAL ROOFING

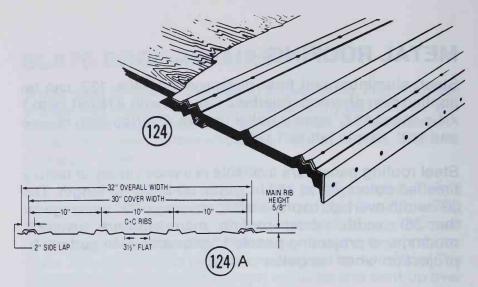
Steel, aluminum and fiber glass roofing, Illus. 122, can be applied over plywood sheathing covered with #15 felt, or to 1 x 4's spaced 12" apart parallel to eave. Overlap each course and end. Staple felt to 1 x 4,s.

Steel roofing panels are available in a wide variety of factory finished colors, 32 to 38" in width, up to 32" in length. The 32" width overlaps to provide 30" coverage; 36" coverage for the 38" width. Metal roofing manufacturers generally recommend projecting panels 1" over eave with gutters, 2" projection when no gutter is used.

5V aluminum roofing panels are overlapped as shown, Illus. 122. Always nail through high point of corrugation or V crimp.

While no starter strip is required at eave, you can cut and bend strips of 5V crimp and use same along gable, Illus. 123, 124.





Illus. 124A shows method of overlapping steel roofing.

The gable starter strip is nailed in place. Roof panels are placed on top, Illus. 124.

Lap corrugated or 5V crimp roofing amount shown, Illus. 122.

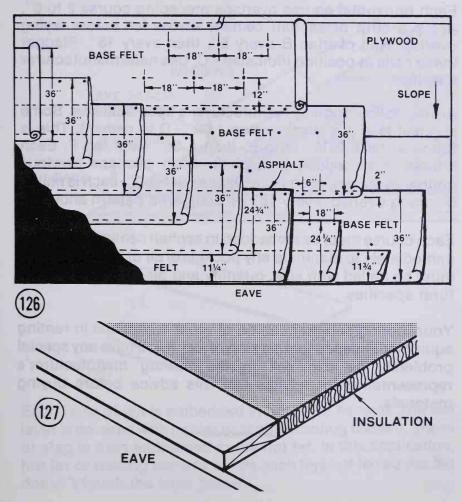
Corrugated sheets are nailed through the top of a corrugation. Use 1¾" big head aluminum roofing nails with neoprene washers, Illus. 125, when nailing 5V crimp aluminum roofing. Space nails 8 to 12" apart. Always nail in position indicated, Illus. 122,124.



BUILT UP ROOFING

Built up roofing, Illus. 126, is what the name implies, layers of asbestos felt and asphalt cement or hot roofing pitch bonded to plywood sheathing or rigid insulation.

When applying built up roofing to rigid insulation, follow insulation manufacturer's directions. This usually specifies an eave and gable edge board, Illus. 127, equal in thickness to insulation. Nail to roof sheathing.



The insulation is bonded to plywood with cement manufacturer specifies. The insulation is covered with asphalt cement. 36" wide felt A, Illus. 126, is bonded in position. Most roofers use a roller. These can be rented from roofing retailers or rental tool stores.

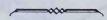
Laying a built up roof follows this general procedure. The base sheet, 36" wide saturated asbestos base felt, Illus. 126, is nailed or stapled along eave edge every 6", and every 18" along lines snapped 12" up from bottom and 12" down from top.

Each horizontal course overlaps preceding course 2 to 6". Apply a strip of asphalt cement across felt before laying overlap. Nail overlap B every 6", then every 18". Stagger these nails in position indicated - C. Use nails manufacturer specifies.

Always follow roofing manufacturer's specifications. Some suggest laying a starting strip 11¾" - D in cement. This is followed by a 24¼" strip E, then a 36" wide felt F. Each course is embedded in asphalt, each overlaps previous course as shown; each is overlapped at top 2", each is nailed 6" along overlap, every 18" on staggered pattern shown.

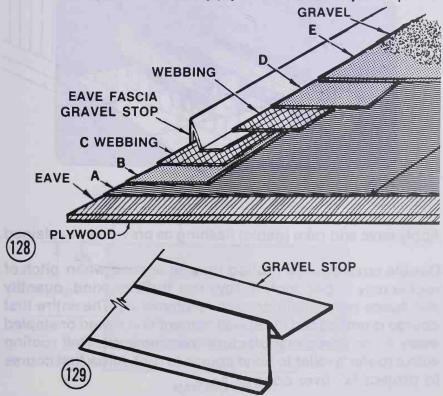
Each course must be embedded in asphalt cement and rolled immediately to eliminate any pockets of air or buckling. Each must be nailed with size, quantity and placement manufacturer specifies.

Your roofing supplier can be of great assistance in renting equipment needed for this kind of job. If you have any special problems, he can call in the roofing manufacturer's representative for advice. Get this advice before buying materials.



BUILT UP ROOFING WITH GRAVEL STOP

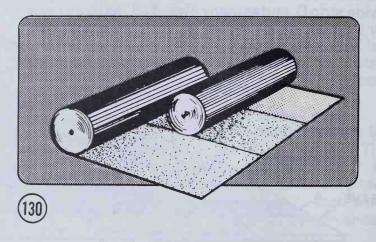
A gravel stop, Illus. 128,129, should be used when built up roofing is to be covered with gravel. In this application, the plywood sheathing is covered with #15 felt A. The starter strip B, Illus. 128, is nailed or stapled in position. Asphalt cement is applied and a strip of webbing C is embedded. Apply cement and nail gravel stop in position every 4". Apply cement and cover with another strip of webbing. Next apply a 24" wide strip D, and asmany plys of 36" felt E as job requires.



Each layer of felt is embedded in hot tar or cement. The last layer is covered with hot tar or asphalt roofing cement, gravel or slag is then embedded in the hot tar. In this application, hot tar or roofing cement bonds each layer of felt so the felt doesn't touch the layer below.

DOUBLE COVERAGE ROLL ROOFING

One of the easiest, quickest and least complicated methods of applying a good roof fast is with mineral faced, double coverage, roll roofing. Each course laps 19". This mineral faced roofing comes 36" wide, Illus. 130. The lower half of the surface is covered with mineral coated pellets, the upper half is smooth. Each roll covers 51 sq. ft.

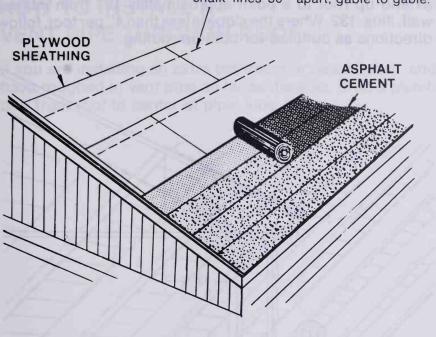


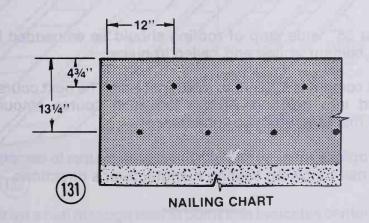
Apply eave and rake (gable) flashing as previously explained.

Double coverage roll roofing may be applied when pitch of roof is only 1" per foot. Always use the size, kind, quantity and space nails manufacturer recommends. The entire first course is embedded in asphalt cement and nailed or stapled every 4", or space manufacturer recommends. Roll roofing with a roofer's roller to bond course to roof. Allow first course to project 3%" over edge of eave.

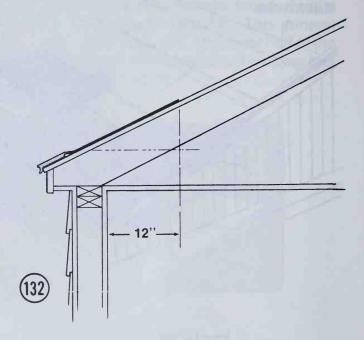
Use unsurfaced selvage for a 19" wide starter strip. Cut it to length required to extend %" over gable ends. Embed in asphalt cement. The starter strip is nailed just above eave and gable flashing and in a staggered pattern, Illus. 131. Use a roller to embed strip in cement, then nail every 12".

To keep each course on line, snap chalk lines 36" apart, gable to gable.





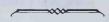
The width of the starter strip is determined by slope of roof. If roof pitches 4" or more per foot, the starter strip should extend up roof to a point approximately 12" from interior wall, Illus. 132. Where the slope is less than 4" per foot, follow directions as outlined for built up roofing.



The first 36" wide strip of roofing should be embedded in asphalt cement, rolled and nailed in place.

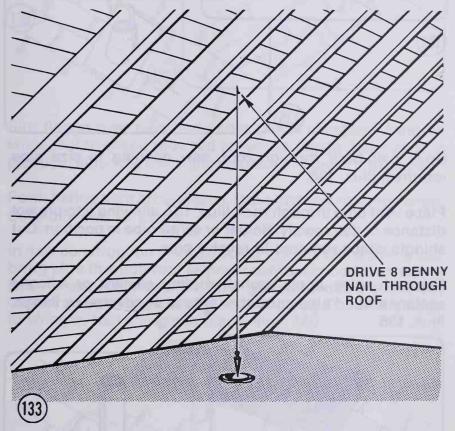
Asphalt cement is applied to the upper half. The next course is rolled into position. Always lap each course amount roofing manufacturer recommends.

Rent a roofer's roller so you can bond each course to cement. Always nail following roofing manufacturer's directions.



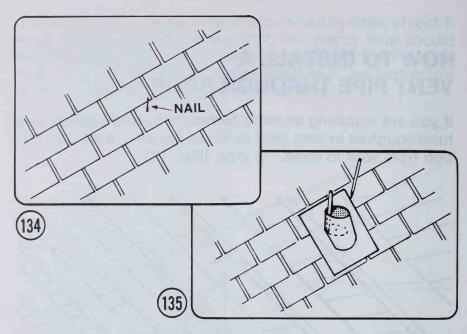
HOW TO INSTALL A VENT PIPE THROUGH ROOF

If you are installing an extra bathroom or new kitchen, and have roughed in vent pipe as far as the attic, drop a plumb bob from roof to center of pipe, Illus. 133.



Drive a nail through roof at point that indicates center of pipe, Illus. 134.

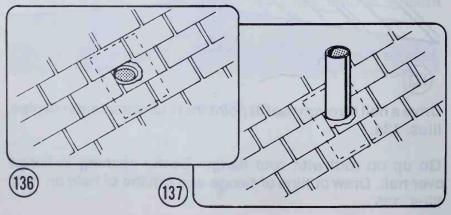
Go up on roof with roof flange. Center opening in flange over nail. Draw outline of flange and outline of hole on roof, Illus. 135.

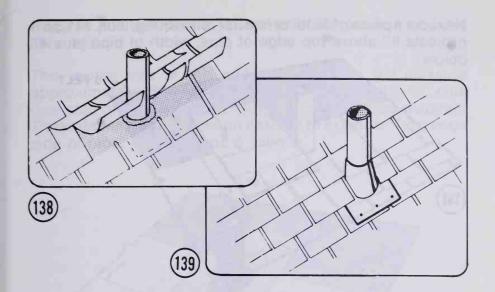


Drive nail back through roof, saw opening to size pipe requires, Illus. 136.

Place vent pipe through roof, Illus. 137, allowing it to project distance codes specify. Solder or screw pipe in position. Cut shingle shape required to receive pipe.

Raise shingles. Apply asphalt roofing cement or silicone sealant around pipe and entire area to be covered by flange, Illus. 138.

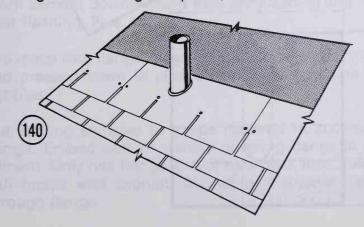




Slip flange over pipe and under raised shingles. Using tin snips, cut to shape required to receive flange. Nail flange in position, Illus. 139. Lay shingles back and press into cement.

Form flange tight around pipe. Use a hammer to bend flange. Carefully seal all joints.

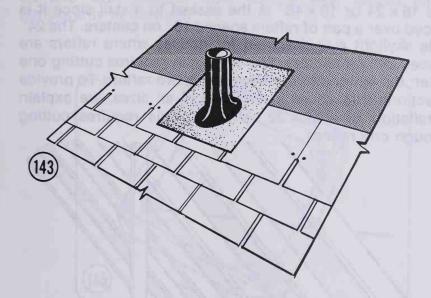
In new construction or when doing a complete reroofing job, bring pipe through roof as previously described. Cut hole in felt. As you apply asphalt, fiber glass or wood shingle, cut hole in shingle. Apply asphalt cement to seal pipe to felt and to shingle. Nail shingle in place, Illus. 140.



Next cut a piece of 55 lb. or heavier roll roofing, Illus. 141, so it projects 8" above top edge of pipe, width of pipe plus 4" below. #15 FELT SQUARE 12" PLUS DIA. OF STACK

Place in position. Use a square to locate position of pipe, Illus. 142.

The overall size of this soil stack flashing will measure approximately 12" plus diameter of stack in width, 12" plus oval size of pipe in length. Cut oval to exact size required. These dimensions will permit flashing to extend 6" from each side of pipe, 4" below and 8" above.



Slip flashing over pipe and position same so it's parallel to course of shingle. Embed flashing in asphalt plastic cement. Work cement down around pipe and flashing and mold it over flashing, Illus. 143.

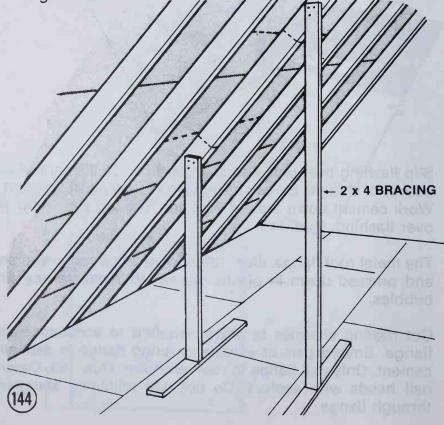
The metal roof flange, Illus. 139, should be placed over pipe and pressed down in plastic cement to eliminate any air bubbles.

Cut roofing shingles to shape required to accommodate flange. Embed part of shingle covering flange in asphalt cement. Only nail flange to roof as shown, Illus. 139. Cover nail heads with asphalt. Do not nail adjoining shingles through flange.

SKYLIGHT INSTALLATION

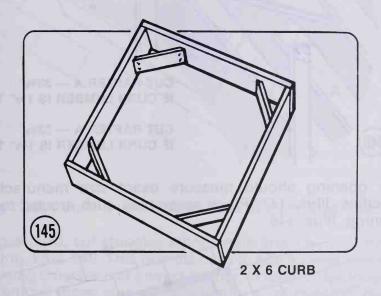
Prefabricated skylights are easy to install. Your building supply retailer offers a wide selection of stock sizes, ranging from 16×24 , 16×48 , 24×24 , 24×48 , 32×32 , 32×48 to 48×48 ".

The 16 x 24 or 16 x 48" is the easiest to install since it is placed over a pair of rafters spaced 16" on centers. The 24" wide skylight was designed for houses where rafters are spaced 24" on centers. The 32" width requires cutting one rafter; the 48" width requires cutting two rafters. To provide directions that cover installation of all sizes, we explain installation of a 32 x 32" skylight. This requires cutting through one rafter.



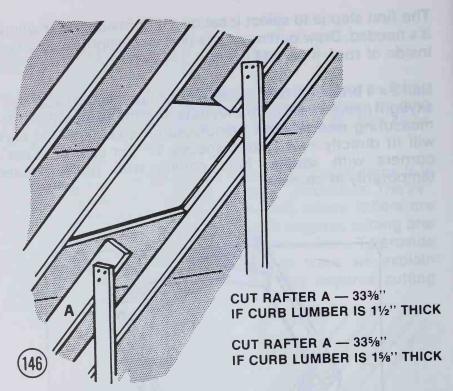
The first step is to select location that provides light where it's needed. Draw outline of opening for skylight selected on inside of roof, Illus. 144.

Nail 2 x 4 braces to rafters being cut, Illus. 144. For a 32 x 32" skylight make a 2 x 6 curb with outside dimensions, Illus. 145, measuring size skylight manufacturer specifies. This curb will fit directly over rafters spaced 16" on centers. Check corners with square. hold square with blocks nailed temporarily in corners.

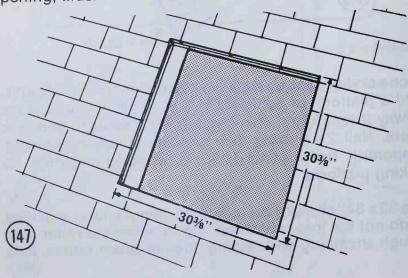


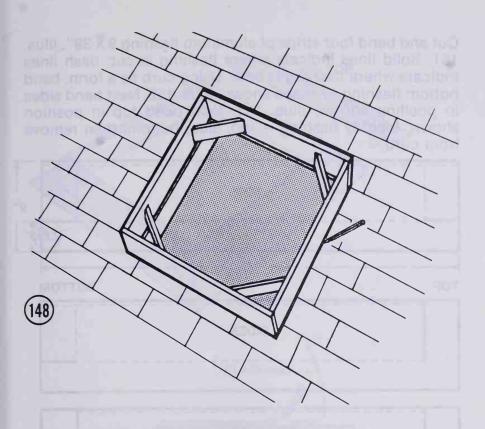
Since a skylight can be installed by working from inside attic, build a platform at sufficient height to allow you to stand halfway through roof opening. Nail 2 x 4 posts to floor and rafters. Nail 2 x 4 cross ties to posts at required height. Temporarily nail a panel of 34" plywood to cross ties for working platform.

For a 32 x 32" skylight cut rafter size manufacturer specifies, but do not cut into roof sheathing. Remove cut rafter. Saw through sheathing and roofing; then between rafters, Illus. 146.



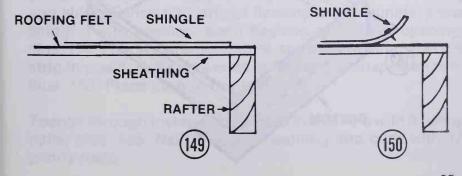
The opening should measure exact size manufacturer specifies, Illus. 147. Place assembled curb around top of opening, Illus. 148.



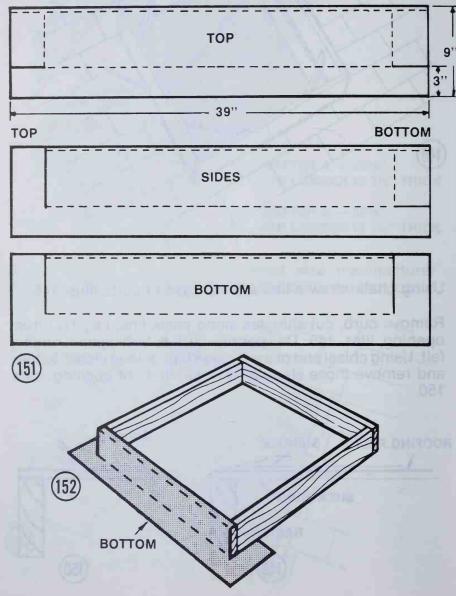


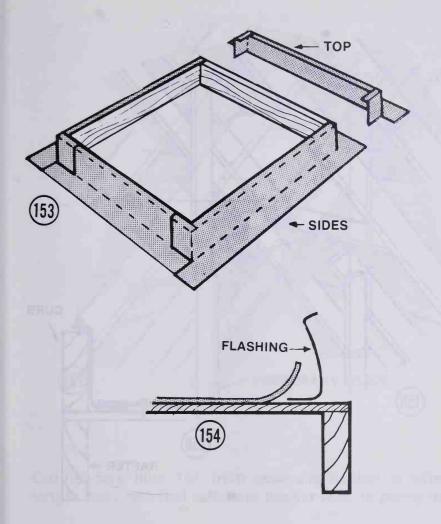
Using chalk, draw a line around base of curb, Illus. 148.

Remove curb, cut shingles along chalk line, i.e., 1½" from opening, Illus. 149. This permits curb to butt against roofing felt. Using chisel end of a wrecking bar, or long chisel, loosen and remove those shingle nails within 4" of opening, Illus. 150.



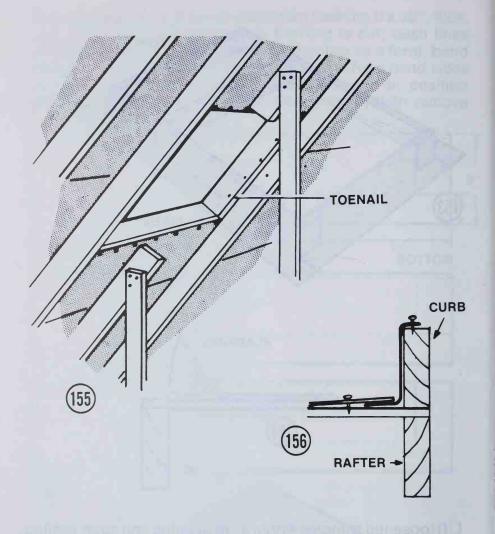
Cut and bend four strips of aluminum flashing 9 x 39", Illus. 151. Solid lines indicate where flashing is cut; dash lines indicate where flashing is bent. Using curb as a form, bend bottom flashing to shape shown, Illus. 152. Next bend sides in position shown, Illus. 153. Next bend top in position shown. Identify flashing — top, side, bottom, then remove from curb.





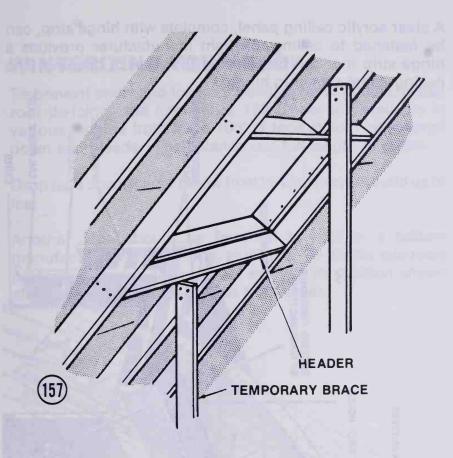
Lift loosened shingles within 4" of opening and apply roofing cement, Illus. 150. Apply roofing cement between flashing and shingle. Insert 3" strip of flashing under shingle, press shingles into position, bend flashing away from opening, Illus. 154. Follow same procedure, slip side flashing, then top strip in position. Be sure ends of flashing overlap as shown, Illus. 153. Place curb in position.

Toenail through inside edge of curb into rafters with 8 penny nails, Illus. 155. Nail through sheathing into curb with 16 penny nails.



Bend bottom flashing back into position and nail top edge to curb, Illus. 156. Use 1" aluminum nails spaced about 12" apart. Next bend and nail side flashing in position, then top flashing. You can either solder corners or bond with epoxy. Do not nail. You can nail shingles up to, but not through flashing. Paint exposed shingle nail heads with roofing cement.

Nailing to top of curb optional. Skylight frame provides a tight seal.



Cut headers, Illus. 157, from same size lumber as rafter to length required. Nail rafters to header with 16 penny nails.

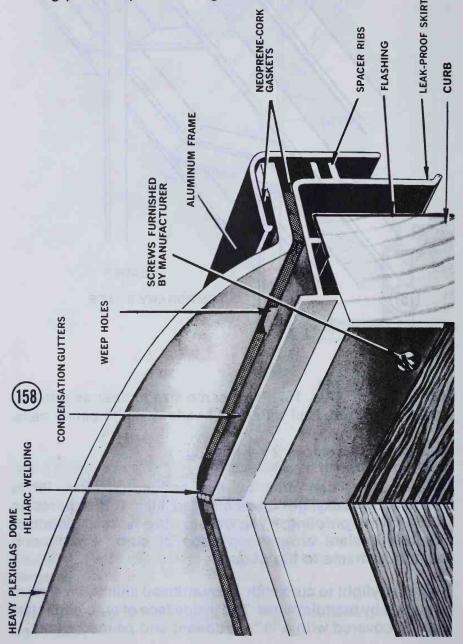
You can now remove 2 x 4 bracing.

The skylight can now be fastened in position. While installation of skylight recommended, Illus. 158, requires no further waterproofing, if you want to run a 1/6" thick ribbon of silicone sealant around top edge of curb, it will bond aluminum frame to top of curb.

Fasten skylight to curb with 16 roundhead aluminum screws provided by manufacturer. The inside face of curb and rafter can be covered with a 1/4" hardboard and painted white.

A clear acrylic ceiling panel, complete with hinge strip, can be fastened to ceiling. Skylight manufacturer provides a hinge strip that can be screwed to inside of opening. The

ceiling panel slips into hinge.

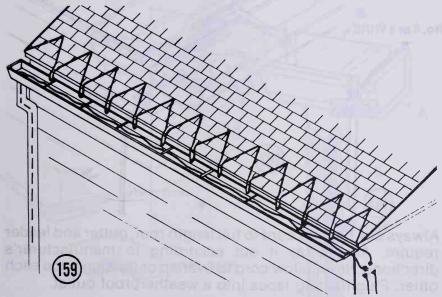


WINTERIZING YOUR ROOF

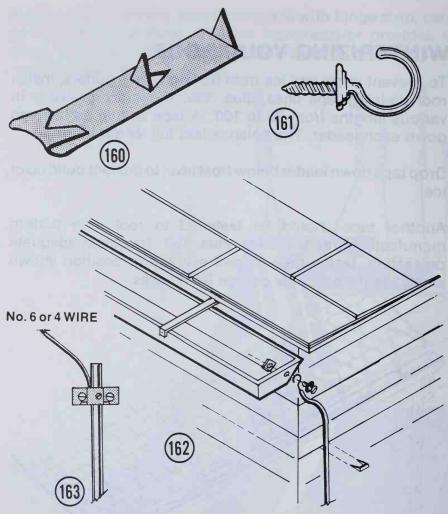
To prevent snow and ice from building up in gutters, install roof de-icing tape lines, Illus. 159. These are available in various lengths from 20 to 100'. A tape should be lowered down each leader. The balance laid full length in gutter.

Drop tape down leader below frost level to prevent build up of ice.

Another tape should be fastened to roof in a pattern manufacturer recommends, Illus. 159. To obtain adequate protection, fasten tape to roof every 2' in position shown along the third shingle course from eaves.



The manufacturer of heating tapes provides sharp clips, Illus. 160. These are slipped under asphalt shingles. We don't recommend using these under wood shingles. Brass screw hooks, Illus. 161, can be used. Screw in position and daub cement over base. The hooks permit removing tapes in the spring. A stapling gun can also be used to hold tape. Be sure staples don't damage insulation on tape.



Always buy heating cord to full length roof, gutter and leader require. Always lay it out according to manufacturer's directions. Never allow cord to overlap or lay alongside each other. Plug heating tapes into a weatherproof outlet.

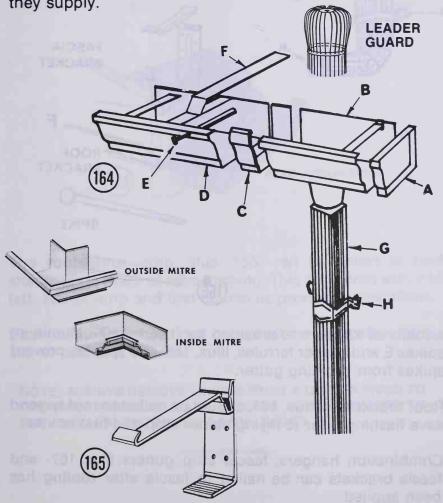
Always take it down in the spring as the hot summer sun won't do it a bit of good.

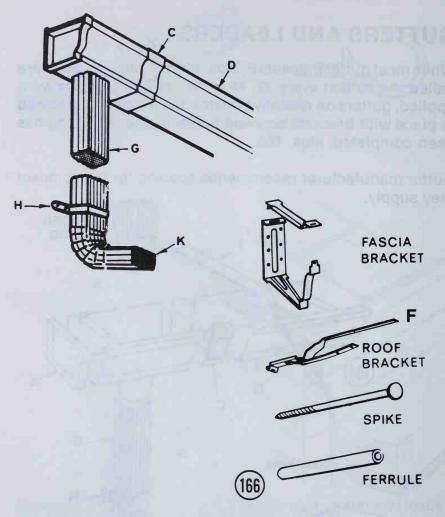
While most gutters are grounded by leaders running into ground, play safe. Drill a hole in gutter, Illus. 162, and fasten a 6 or 4 gauge solid conductor insulated wire to a pipe in ground, Illus. 163.

GUTTERS AND LEADERS

While most gutter brackets F, Illus. 164, on older houses were nailed in position every 32, 48 or 64" before shingles were applied, gutters on recently constructed houses are secured in place with brackets screwed to fascia after shingling has been completed, Illus. 165.

Gutter manufacturer recommends spacing for type bracket they supply.

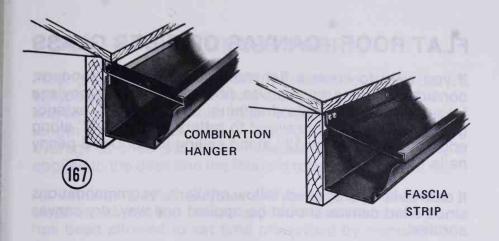


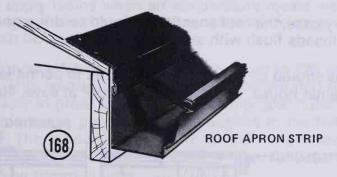


Additional support is provided by inserting 7" aluminum spikes E and spacer ferrules, Illus. 166. The spacers prevent spikes from buckling gutter.

Roof brackets F, Illus. 166, should be nailed to roof beyond eave flashing prior to laying starter strip and first course.

Combination hangers, fascia strip gutters, Illus. 167, and fascia brackets can be nailed to fascia after roofing has been applied.





The roof apron strip, Illus. 168, can be nailed to roof sheathing in place of eave flashing. This is covered with #15 felt, starter strip and first course as previously described.

Seal nail heads with a dab of asphalt cement before laying starter and first course.

NOTE: ALWAYS REMOVE LEAVES FROM A GUTTER PRIOR TO THE FIRST FROST. ALWAYS REPLACE LEADER GUARDS TO PREVENT LEAVES FALLING DOWN LEADER.

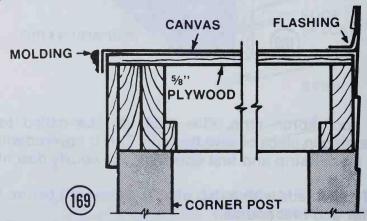
FLAT ROOF - CANVAS OR FIBER GLASS

If you want to cover a flat roof and use it for a sundeck, consider covering with canvas, fiber glass or polypropylene fabric. If the roof needs sheathing, apply % or ¾" exterior grade plywood. Nail plywood to rafters every 6 to 8" along edge of panels, every 12" along ceiling joists. Use 8 penny nails.

If canvas is to be applied, follow retailer's recommendations since oiled canvas should be applied one way, dry canvas another.

In every case, the roof sheathing should be dry, smooth and all nailheads flush with sheathing.

Canvas should be cut to length required to permit laying 4" up against house, and over edge of roof at eave, Illus. 169.



Dry canvas is usually applied with linseed oil paint. The surface to be covered is painted and the canvas is embedded in the wet paint. It is then rolled to secure canvas to deck. All air pockets and wrinkles must be eliminated.

Overlap courses amount retailer suggests and nail through overlap. Allow to dry and apply as many coats as paint manufacturer recommends for a canvas deck.

ROOF — FIBER GLASS FABRIC

Fiber glass is an excellent roofing material for flat decks. It's easy to apply and trouble free. Fiber glass comes in 38, 44, 50 and 60" widths and in rolls up to 100 yards. The fabric is cut to length roof requires, plus 6" overage up side of house; 4" overage at ends and eave. A special resin bonding coat is applied to the deck and the fabric is rolled onto the wet resin.

All wrinkles and air bubbles are immediately rolled out. A clear or colored top coat is applied when the bonding coat has been allowed to set time prescribed by manufacturer. Always apply resins when air temperature meets manufacturer's specifications. Additional coats of resin or epoxy paint can be applied.

Polypropylene fabric is available in rolls up to 125 yards in length. This wonder fiber is in direct competition to fiber glass. Now in great demand for covering boat hulls, decks and cabin roofs, polypropylene is applied in the following manner. The fabric is first cut to overall length required. Allow 6" up side of existing building, 4" over eaves and ends. This can be trimmed later.

A clear polyester resin called Paraplex P-463 is applied to the surface. The fabric is embedded in the resin. It's important to immediately eliminate all air pockets and wrinkles. Each length of fabric is butted, not overlapped. After allowing to dry time specified by resin manufacturer, additional coats of resin are applied.

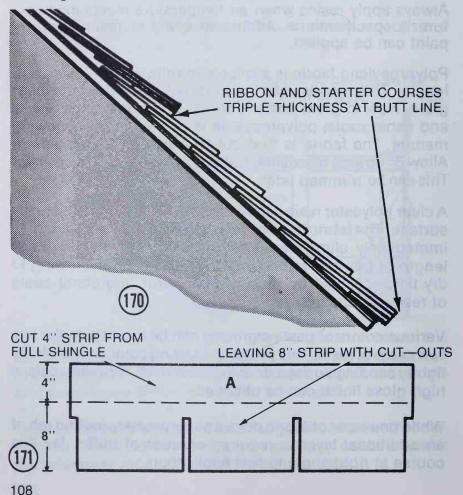
Various colors of paste pigments can be mixed with the last two coats of resin. This provides a lasting color and finish. By lightly sanding surface or using steel wool between coats, a high gloss finish can be obtained.

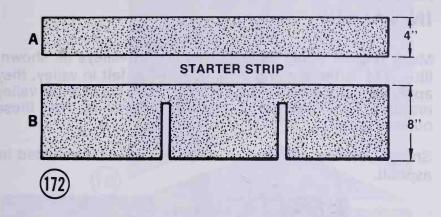
While one layer of fabric does a superb waterproofing job, if an additional layer is required because of traffic, lay this course at right angle to first application.

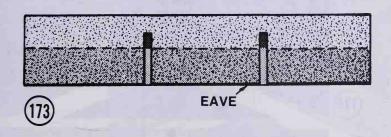
ADDITIONAL FACTS ABOUT ROOFING WITH ASPHALT AND FIBER GLASS

Illus. 170 shows a roof with what is known as a ribbon course every fifth course. Many homeowners prefer this since it provides a distinctive look.

To apply, cut a 4" strip A, from top part of a shingle, Illus. 171,172. Use this as a starter strip full length of eave. Position starter flush with flashing or project 1/4" beyond edge of flashing.







Next nail the 8" balance B in position shown. This is placed flush with edge of A, Illus. 173.

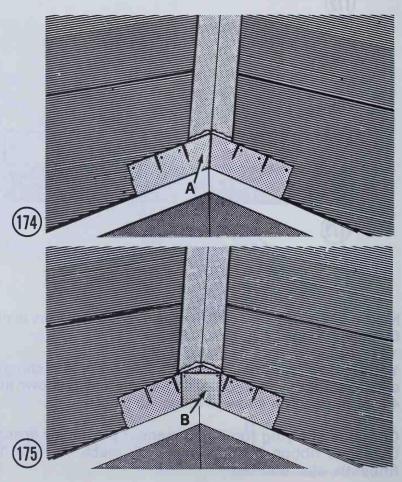
You are now ready to apply the first full course of shingle. Be sure to stagger joints so slots are staggered as shown in Illus. 44, or in position shown in Illus. 48,51.

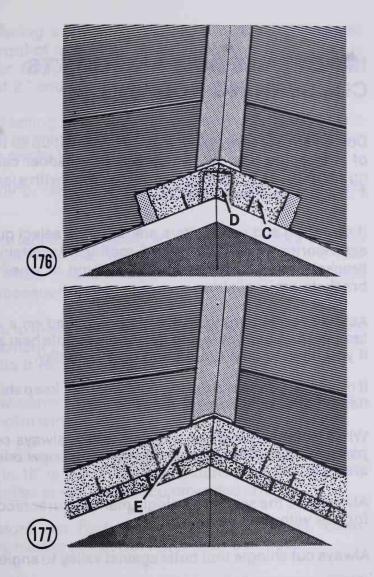
Continue applying roofing in manner previously described. Duplicate ribbon buildup when you reach the fifth, tenth, fifteenth, etc., courses.

APPLICATION OF ASPHALT SHINGLES IN VALLEY

Many roofers apply asphalt shingles in valleys as shown, Illus. 174. After stapling #15, 50 or 90lb. felt in valley, they apply asphalt cement. A pair of shingles A, cut to angle valley requires, is embedded in asphalt, bottom up. Nail these outside valley.

Shingle B, Illus. 175, cut to shape shown, is embedded in asphalt.





Shingle C, Illus. 176, slot down, is cut to angle indicated and in position slots require so they don't line up with previous course. The valley end of C is embedded in asphalt, while the balance of the shingle is nailed in place.

D, Illus. 176, is then applied repeating B.

Course E, Illus. 177, is offset amount required for normal exposure.

IMPORTANT DO'S AND DON'TS CONCERNING ROOFING

Don't slam a ladder againt a gutter. Stand it up so the weight of ladder and user will be on ladder. A ladder can crack a gutter or break a bracket. Reinforce gutter with a length of 2 x 4 or 2 x 6 as shown Illus. 19.

If reroofing and new gutters are required, select gutters and accessories when you select roofing. Ascertain whether brackets are nailed on top of sheathing or whether gutter brackets are available.

Asphalt roofing shingles should be applied on a day when temperature permits laying flat. Apply as little heat as needed if you have to take out a bend on a cold day.

If repairs are required during cold weather, keep shingles in a heated area until you are ready to apply.

When shingling over an existing valley, always cut away a part of adjacent shingle so you can cut a new one to cover area cut away.

Always use the sealant a shingle manufacturer recommends for use with their shingles.

Always cut shingle that butts against valley to angle required.

Whenever you find it necessary to face nail asphalt roofing shingle, cover nailhead with asphalt cement.

When matching odd shaped shingles, always inquire about application. Odd shaped shingles frequently require special nailing.

Always use size and shape nail manufacturer recommends.

When covering a chimney cricket, always extend copper covering roof of cricket up under shingles at least 4"; 6" is even better. Copper against chimney should also be turned up at least 2" and counter flashed as shown.

Counter flashing should lap step flashing at least 4" and should not be soldered. If counter flashing cannot be installed in one piece, lap each vertical joint 2".

Step flashing, laid between courses of shingles, should lap 2".

After an extended dry spell, some built up roofs develop hairline openings that leak with the first rain. As the roof expands, these cracks close and the roof will remain tight during subsequent rains.

If you have to make a roofing repair in cold weather, keep the asphalt cement in a heated area until it's needed, and only use it while it remains flexible.

Always disconnect heating tape electric plug before working on a roof in winter.

When replacing a gutter, always remember to give it a slight pitch, 1" in 16" is the accepted standard. 5" half round or U shaped gutter is minimum recommended size.

Always store roll roofing standing up in a dry, clean, preferably heated place, but never near a furnace.

Always make certain a new roof is nailed properly. When reroofing, always nail down any loose shingles. Always fill in where shingles are missing before applying new course.

Always roll out roofing and give it time to flatten out before applying. This is extremely important when the air temperature drops below 50°.

Store cans or drums of roofing asphalt on end and level.

Protect bundles of shingles from rain and snow. Keep out moisture. Moisture freezes in cold weather and can damage shingles.

Never heat asphalt or shingle beyond that specified by manufacturer.

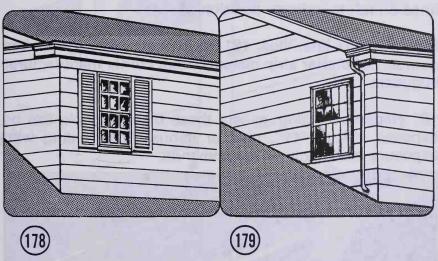
Always replace lids on cans of asphalt cement when not in use.

Don't apply roll roofing or asphalt cement when the air temperature is 40°F or below. Don't apply hot asphalt during a period when overnight temperature may drop below 40°F.

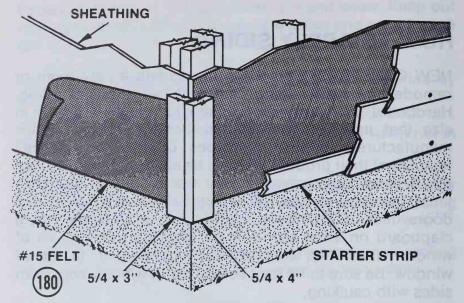
Never apply roll roofing, asphalt shingles or asphalt roofing cement during wet weather, rain, snow or heavy dew.

HOW TO APPLY SIDING

NEW CONSTRUCTION. If you are adding a new room or remodeling, apply siding that matches existing siding. Hardboard, vinyl and metal siding clapboard is available in size that matches conventional wood clapboard. While manufacturers provide directions covering the special features of their product, all must be applied to complement the exterior appearance of your home. This necessitates lining up a course with the top and bottom of windows and doors, Illus. 178. Where you run into a situation where clapboard on sides can only be lined up with bottom of window, Illus. 179, cut notch in clapboard to fit top of window. Be sure to fill joint across top of window and down sides with caulking.



Most manufacturers of prefinished siding provide a starter strip, Illus. 180. An experienced applicator lines up the starter strip so the first course of clapboard lines up with siding on existing building. This is usually nailed in position to allow first course to overlap foundation 1". After locating exact height, check starter strip with level before nailing in position.



Since siding should be nailed into studs, locate and draw lines on felt to indicate position of studs.

Snap a chalk line, Illus. 181, to indicate top edge of first course. Set starter strip distance from corner manufacturer suggests.

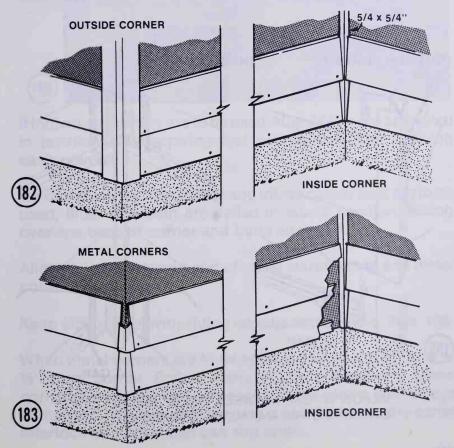
12" clapboard siding, except those that interlock, can be exposed 10½ or 11", plus or minus. Apply siding with exposure manufacturer recommends.

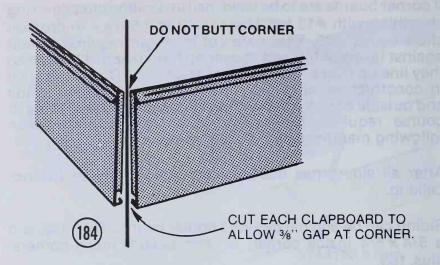


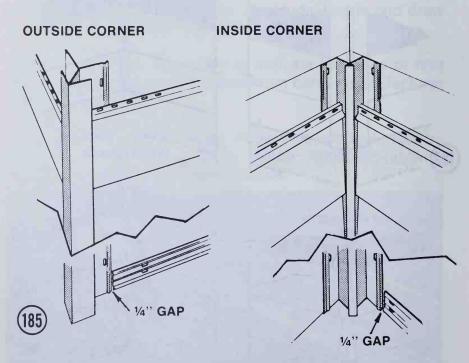
If corner boards are to be used, nail in position after covering sheathing with #15 felt. Use 5/4 x 3 and 5/4 x 4 in position shown, Illus. 180, These are cut to length required to butt against fascia at top and to overlap foundation at bottom so they line up with bottom edge of clapboard. Due to variance in construction, always measure distance between inside and outside corner boards and cut clapboard to length each course requires. Be sure to allow joint for expansion following manufacturer's recommendation.

After all siding has been applied, fill joints with exterior calking.

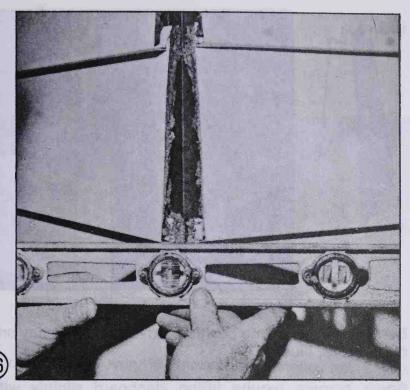
Siding can be applied between corner boards, Illus. 182, and a 5/4 x 5/4 inside corner; or with outside metal corners, Illus. 183.







ALLOW 1/4" GAP BETWEEN END OF METAL STARTING STRIP AND METAL CORNER



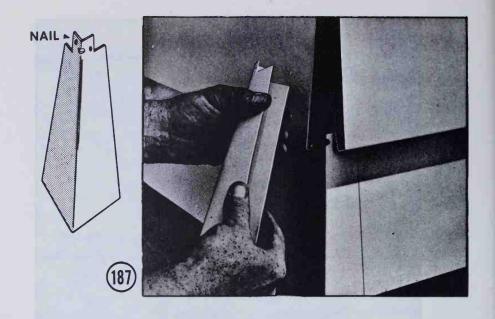
If individual corners are to be used, Illus. 184, these are nailed in position after applying first course, and after applying each course.

If a one piece outside corner and inside corner post are to be used, Illus. 185, both are nailed in plumb position. Siding overlaps base of corner and butts against it.

Allow 1/4" gap between end of metal starting strip and metal corner.

Keep siding level with siding on adjacent corners, Illus. 186.

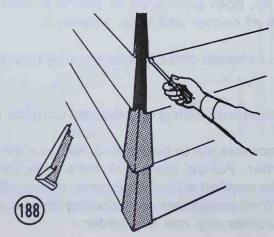
When metal corners are to be applied, recess siding ¼, ¾ to ½" from corner. Follow manufacturer's directions. Some corners can be applied with each course, others after side is completed. When necessary, use a screwdriver to pry panel interlock so corner cap can slip under.

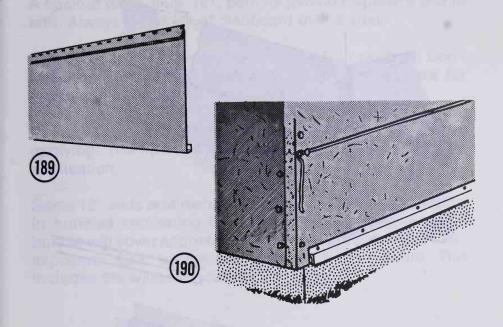


Bend corner, snap into position. Drive one nail in any one of three holes, Illus. 187.

Some corners require lifting clapboard slightly with a screwdriver, Illus. 188.

Insulated siding requires ¼ to ½" set back from corner. Non-insulated metal siding sets ½ to ¾" from corner. Follow siding manufacturer's directions.



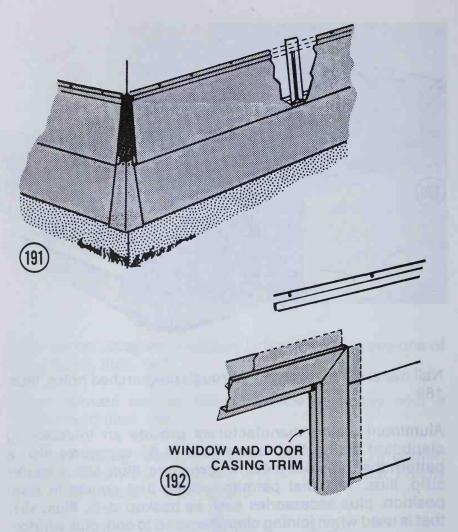


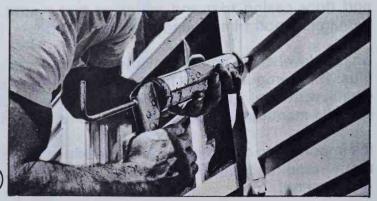
Nail metal siding every 16" through prepunched holes, Illus. 189.

Aluminum siding manufacturers provide an interlocking clapboard siding that is available in 8" exposure; also a pattern that provides a 4 or 5" exposure, Illus. 189; a starter strip, Illus. 190, that permits locking first course in level position, plus accessories such as backup strip, Illus. 191, that is used when joining clapboard end to end; plus window and door casing trim and moldings that permit covering damaged wood trim around windows and doors, Illus. 192.

Snap a level chalk line to indicate top edge of first course, Illus. 190. Temporarily nail first course of siding at each end. Check with level. Then using 8 penny rustproof siding nails, or nails manufacturer recommends, nail siding into studs.

It's important to read the siding manufacturer's directions as many require special application. Use size nails they recommend.





A backup plate, Illus. 191, permits joining clapboard end to end. Always join ends of clapboard over a stud.

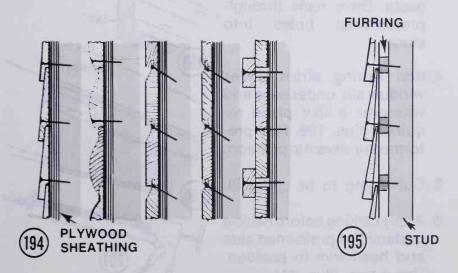
Cut each length of siding so it fits freely in position. Don't force or attempt to spring it in place. Always allow for expansion and calk all joints, Illus. 193.

If you are applying wood clapboard, prime coat before applying. Then paint with two coats of exterior paint after application.

Some 12" wide prefinished siding is sold in 12 to 16' lengths, in bundles containing 80 square feet. An 80 square foot bundle will cover approximately 64.8 square feet with a $10\frac{1}{2}$ " exposure; 68.8 square feet with an 11" exposure. This includes 5% waste for cutting and fitting.

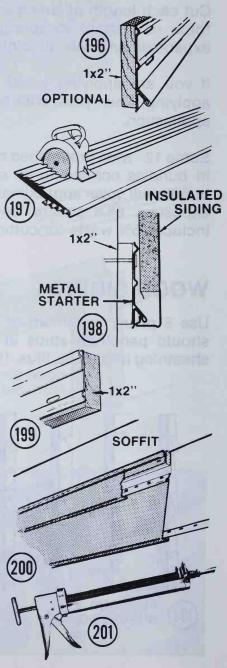
WOOD SIDING

Use 8 penny aluminum or hot dip galvanized nails. Nails should penetrate studs at least 1". Nail siding through sheathing into studs, Illus. 194, or through furring, Illus. 195.

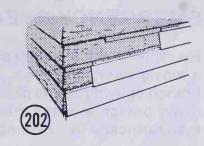


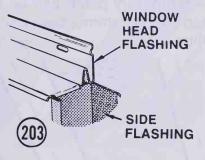
SIDING APPLICATION CHECKLIST

- 1. An optional way is to apply a 1x2 furring strip to perimeter of house, Illus. 196. Nail metal starter strip to furring strip. Recess starter strip distance from corner manufacturer suggests.
- 2. Use a square prior to cutting siding, Illus. 197, to length required between inside and outside corners, less 1/4" or amount manufacturer recommends for an expansion joint at each end.
- Lock siding to starter strip, Illus. 198. Hang siding on nails manufacturer suggests. Drive nails through prepunched holes into studs.
- Nail furring strips under window sill, under eave and wherever a low place requires, Illus. 199. Nail preformed undersill in position.
- 5. Cut siding to fit undersill.
- Apply calking before nailing undersill or preformed side and head trim in position. Use a gun, Illus. 201.



- 7. Slip each length into the lock strip on top of previous course, Illus. 202. Snap it securely in position, then drive nails in prepunched holes into studs.
- 8. Cut window head flashing to width of casing plus ½", Illus. 203. This permits bending head flashing ¼" over side trim. Apply calking before nailing head trim in position.
- 9. Always cut clapboard to overall length required less 1/4" to allow 1/8" expansion joint at each end. Fill expansion joints with calking.

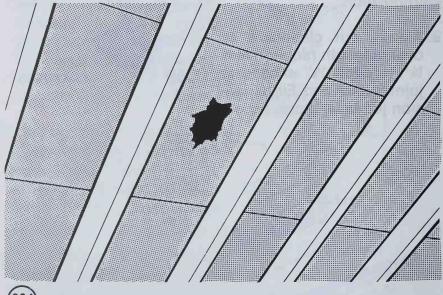




EMERGENCY SHEATHING REPAIRS

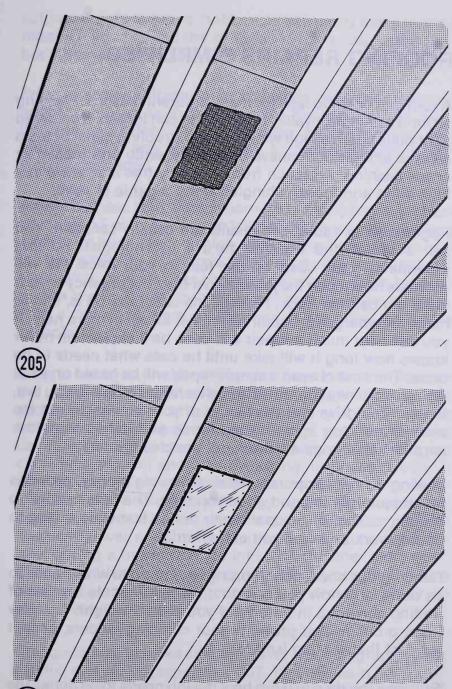
Everyone who has ever experienced a hurricane, or watched a movie version of same, appreciates the damage a heavy branch or flying debris can do to a roof. It doesn't take a very heavy branch to break through roof sheathing even in less than hurricane force winds.

A temporary patch can be made using the elastic polymer tape. First hammer back or cut away any projecting splinters, Illus. 204.



204)

Roll the polymer tape over entire area, Illus. 205. Try to embed it as far into a crack as possible. Cut an aluminum covering plate, Illus. 206, to overall size required to cover the entire damaged area. Drill 5/32" holes 1" from corners and 2" apart in position noted. Place plate in position. Use an awl to make pilot holes in sheathing. Screw plate to sheathing with 5%" No. 8 flathead wood screws. Do not use nails. Tighten screws so tape presses out around edges.



CUT PLATE TO SIZE REQUIRED SO IT PROJECTS 2" BEYOND EDGE OF HOLE IN EACH DIRECTION.

ROOFING REPAIRS SIMPLIFIED

A roof can begin to leak for many different reasons. Flashing around a chimney, valley or vent pipe can loosen, a soldered joint pulls apart, a high wind loosens a roofing panel or tears away a shingle. Chimneys frequently settle and loosen or break flashing. A branch from a nearby tree may wave in a high wind and loosen shingles along a gable or eave.

Regardless of cause, the results are usually constant. You call a roofer and discover he's a psychologist. He first determines your need by the fear in your voice. He will estimate how much the job will cost from the urgency of your need. To bait the hook, he explains how busy he is, and to make an emergency repair he'll have to call in extra help. If you ask how much a repair will cost, he'll explain he never knows how long it will take until he sees what needs to be done. The cost of even a simple repair will be based on what the roofer thinks you can afford after he sees the way you live, the car you drive and the height of your anxiety to get the work done. You agree to his terms and then comes the surprise. He brings a helper and doubles the rate.

Making even a temporary repair saves big money, provides on site job training and gives you time. The time needed to make a really professional repair or find someone willing to do the work at a cost you can afford.

Reading this book, conditioning your mind to what needs to be done, and how you can do it, helps eliminate the fear of finding someone in a hurry. If you have a weight, nerve or heart problem that prevents your climbing ladders, accept the fact that roofing isn't for you.

Still take the time to learn how the job needs to be done. The next step is to hire someone to do it. Most youth with

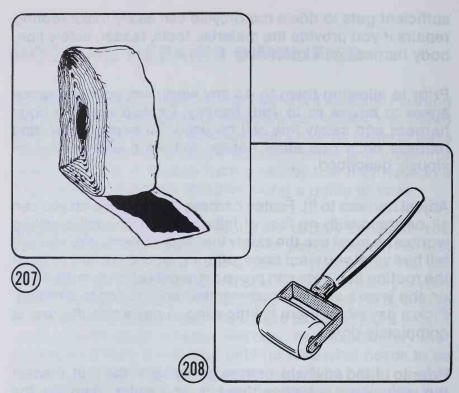
sufficient guts to ride a motorcycle can easily make roofing repairs if you provide the material, tools, ladder, safety line, body harness and know how.

Prior to allowing them to do any work, ask your insurance agent to advise as to your liability. Explain how the body harness and safety line will be used. To explain how, test harness on a one story garage following directions previously described.

Adjust harness to fit. Fasten harness to safety line so you can sit or stand with no fear of falling. When you tell a willing worker he must use the safety line and harness, and you will tell him what you want done, offering an opportunity to learn the roofing business can prove extremely attractive. Insist he or she wears shoes recommended and no loose clothing. Pick a day when there is little wind. A day when the roof is completely dry.

Prior to hiring any help, or even going up on the roof, inspect the attic. Note whether there is any water stain on the sheathing or rafters. In many cases, water will follow a rafter before dropping. If you have a slate roof, you may even see daylight through a crack between sheathing boards. If you can't find any wet spots on sheathing, note area around a vent pipe or chimney. Flashing around these or in a valley may loosen. A soldered joint may open. Some roofs only begin to leak at the start of a heavy rain. Sheathing boards frequently swell and slow or stop the leak. If you can't locate a leak during a heavy rain, go into the attic after a dry spell. Even a hairline crack in flashing can frequently cause a damaging leak. Have someone play a stream of water on each area you want to inspect.

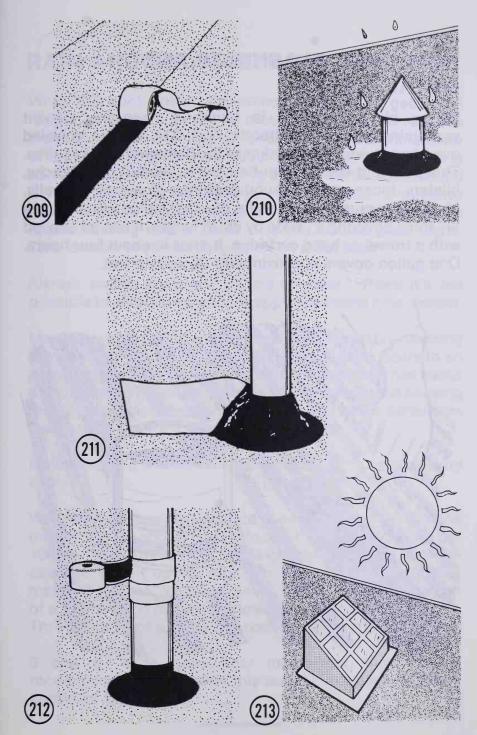
One quick way to make a repair is with black or gray polymer elastic, self sealing tape, Illus. 207. This comes in 2½ and 8" widths in 25' rolls. It seals every kind of crack and does a quick and permanent job. It can be used on wood, metal,



fiber glass or asbestos cement roofing. The tape is protected by pressure sensitive paper backing. Before applying, brush away all dirt. Steel wool copper flashing, blow away dust. Cut tape to length required to overlap crack. Remove paper from inside face. Press tape in place. Using a small wallpaper roller, Illus. 208, roll tape in position. After it's rolled, remove outside protecting paper.

Being elastic, the tape withstands expansion and contraction to a remarkable degree. It's ideal for seams and cracks in metal roofs, in gutters or in asbestos cement or fiber glass roofing panels, and especially flashings.

After all loose granules and particles have been cleaned away, it can also be used on a flat roof, Illus. 209, around a vent stack, Illus. 210, or vent pipe, Illus. 211,212, skylight, Illus. 213, roof stair well, etc. Repairs can be made on drain pipes, air conditioning ducts, truck roofs, mobile homes, etc.



REPAIRING FLASHINGS AND METAL JOINTS

Where bigger damage is found, a neoprene cement containing glass fiber strands, Illus. 214, can be troweled over area to whatever thickness the damaged area requires. This patching cement can be used to repair holes, cracks, blisters, loose seams around flashings, skylights, firewalls, chimneys, vents, parapet walls, etc. One gallon will provide a 1/4" thick covering 1" wide by 85" in length. It can be applied with a trowel or hand cartridge. It dries in about four hours. One gallon covers approximately 20 square feet.



RAIN AND SNOW REPAIRS

While this book doesn't recommend making any gable roof repairs when surface is wet, those repairing a flat roof can make them even during a rain or snowfall. The manufacturer of a fiber glass roofing compound specified for use on wet surfaces recommends troweling the cement in place around a vent pipe, parapet, skylight, etc. Wet patch emergency repair material is also available in a brush type that can be applied during rain or snow. The kits include glass fabric. This is used to reinforce a patch on a flat roof.

Always sweep away any puddle of water. Where it's not possible to eliminate a puddle, apply the trowel type cement.

Making a repair while a roof is leaking helps insure covering the cause of the leak. CAUTION: When a leak occurs in an area containing electrical components, the water can cause a short, start a fire, even transmit electricity to metal housing members on roof. Before going up on roof, make certain the leak has not created an electrical problem.

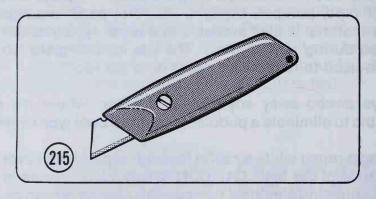
Both the liquid and trowel type material can be used on a dry roof.

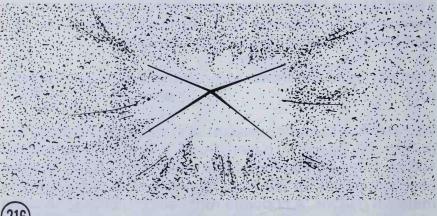
Wet seal liquid roofing sealant is available in 5 gallon pails (minimum), 30 and 50 gallon drums. It requires 2 gallons per 100 sq. ft. on a metal roof; 3 to 4 gallons per 100 sq. ft. when used on a built up felt roof. Gravel roofs require approximately 6 gallons. A concrete roof deck requires application of a primer. One gallon of primer will cover about 100 sq. ft. Three gallons of sealant will then be needed per 100 sq. ft.

3 and 6" wide glass fiber membrane, Illus. 224, is recommended for use with this sealant. The 3 and 6" width comes in 150 ft. rolls.

FLAT ROOF REPAIRS

A flat roof will frequently develop blisters and cracks that cause leaks. On inspection, cut a blister with a razor type knife, Illus. 215, in an X pattern, Illus. 216. Using the razor blade knife, trim the edges of the X about 1/16" off each flap. This is necessary since the blister has stretched the felt.

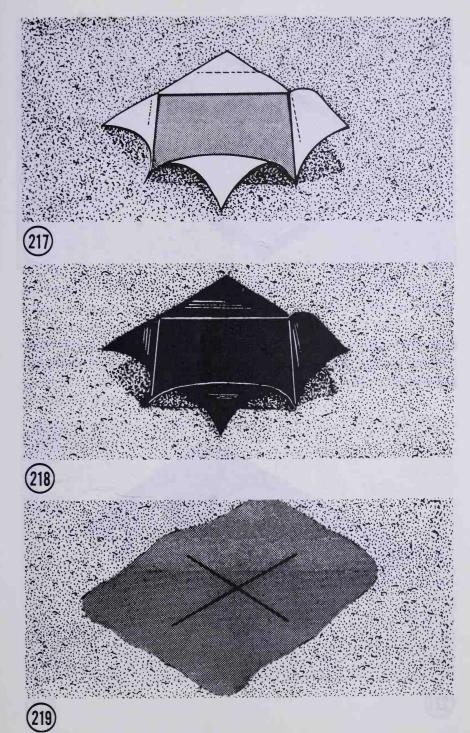


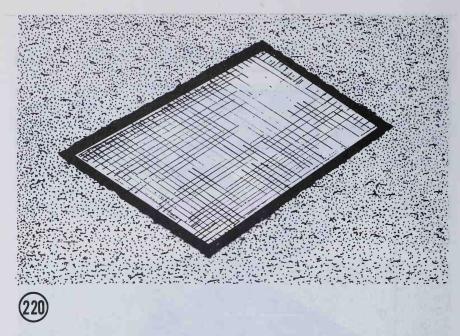


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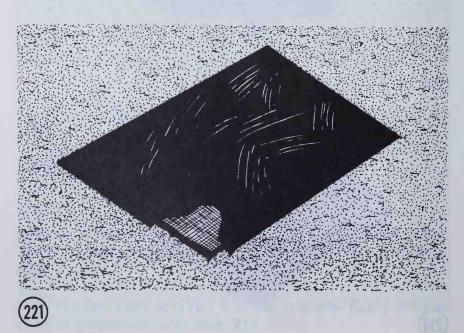
With four parts of X folded back, Illus. 217, apply plastic cement over exposed roof and to bottom of each flap, Illus. 218.

Fold the felt back and roll it down in place. Apply another coat of plastic cement, Illus. 219.



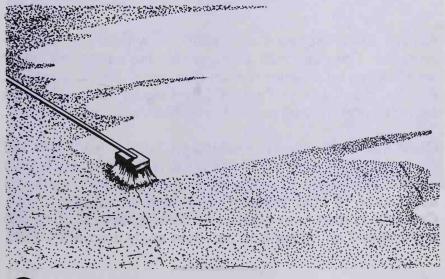


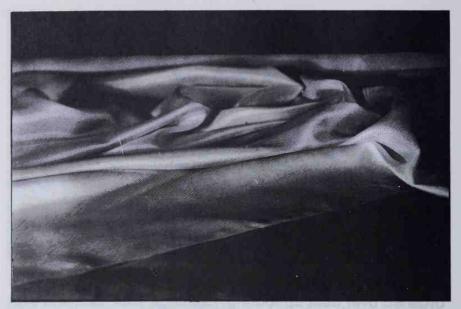
Cut a fiber glass membrane to size needed to overlap X, Illus. 220, by at least 5 to 6". Embed this in cement and cover it with a covering coat of cement, Illus. 221.





An aluminized elastic asphalt based roofing sealant can be brushed over built up roofing, flashings, Illus. 222, and over tin, corrugated iron, and concrete roofing. It's not recommended for gravel covered roofing. A built up felt roof requires about 2 gallons per 100 sq.ft., a tin roof about 1½ gallons. Use a wet seal primer over a concrete roof before applying this sealant, Illus. 223.







Always store asphalt based sealants where they can be protected from the cold. This permits use during the fall or winter when emergency repairs frequently need to be made. Always clean the surface. Do not apply until all loose particles and dust have been removed. Apply with a brush.

Glass fiber membrane is available in 3 and 6" widths in 150 sq.ft. rolls, Illus. 224. A 50" width is also available. Always apply asphalt cement or aluminized roofing sealant prior to application of fiber glass or glass fiber as it's also called. Carefully embed fiber glass in cement. Be sure to eliminate any trapped air. Allow it to set, then apply a covering coat.

CLAY ROOFING TILE

Those who seek the best in a roofing product invariably choose vitrified clay tile, Illus. 225.





As a product receiving the highest Underwriters Laboratory fire resistant rating, these tiles outlast many buildings. Wrecking companies who remove tile properly have no trouble selling same since it can be reused with no loss in color or fire resistant qualities.

Available in a wide selection of both curved and flat, Illus. 226, plus needed accessories, the completed roof adds prestige and a Capital Gains come the day you decide to sell. To estimate coverage, height of needed stringers, etc. note specifics on page 151.

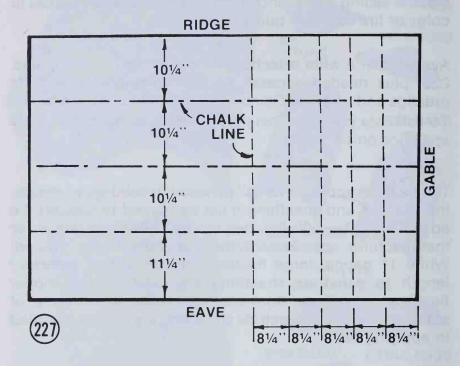
Tile must be applied over ¾" plywood or solid wood sheathing. Rafters and sheathing must be framed to support the added weight — 900 lbs. per square. Use nails retailer or manufacturer specifies for the sheathing being covered. While 11 gauge, large headed copper nails of sufficient length to penetrate sheathing are used to nail copper flashing in valleys, dormers, etc., ring shank nails of sufficient length to penetrate sheathing are usually specified in applying tile.

When applying tile over insulation, stainless steel or silicon bronze screw shank nails are specified. These must penetrate ½ to ¾'' into plywood or solid wood sheathing.

Codes specify tile being applicable on vertical surfaces and on roofs with a minimum pitch of 4" in 12".

Cover roof with 45 or 50 lb. felt lapping each course 2½" horizontally, 6" vertically. Extend felt 6" up any vertical wall.

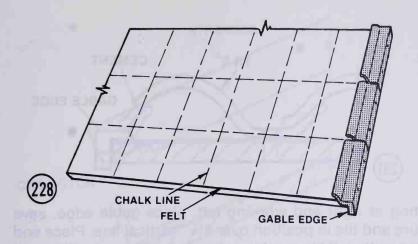
Spanish tile, Illus. 225, measures 131/4'' long, 93/4'' wide. It is laid with an average exposure of 101/4'' in length, 81/4'' in width. A square contains 171 pieces.

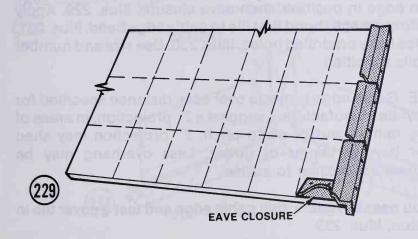


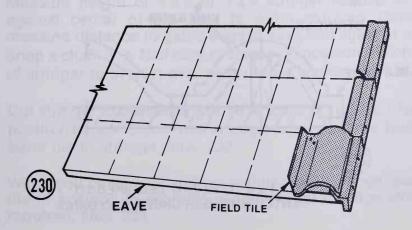
To lay tiles accurately, it's necessary to snap chalk lines on roof horizontally as well as vertically, Illus. 227.

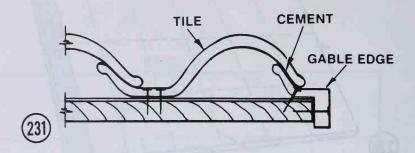
To provide the recommended 2" eave overhang, snap the first chalk line 11¼" from edge of eave, additional horizontal lines are spaced 10¼" apart. Starting at right gable, snap vertical lines 8¼" apart. Always start at right gable facing building and work left. Lay tiles at right angle to eave with an overlap of 3".

The gable edge, Illus. 228, and eave closure, Illus. 229, are nailed in position shown. Tack gable edge in position, place an enclosure and tile to make certain your guide lines are accurate, Illus. 230.





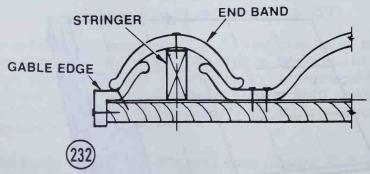




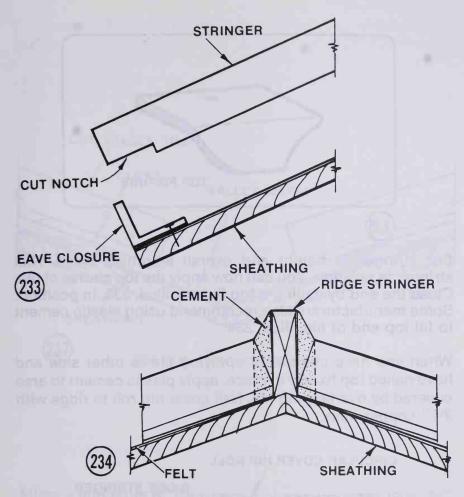
Starting at right and working left, place gable edge, eave closure and tile in position over 81/4" vertical line. Place end tile in position. If tile overlaps as manufacturer specifies, nail gable edge in position, then eave closure, Illus. 229. Apply plastic cement to bond first tile to gable edge band, Illus. 231. All tiles have predrilled holes, Illus. 230. Use size and number of nails specified.

NOTE: Gable edge projects over eave distance specified for tile. While manufacturers suggest a 2" projection, in areas of heavy rainfall and/or steep pitch, 2" projection may shed water beyond center of gutter. Less overhang may be required, ask retailer to advise.

As you near left gable, nail gable edge and test a cover tile in position, Illus. 232.



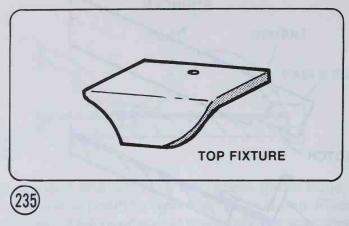
CUT 1 x 4 TO HEIGHT REQUIRED TO CENTER STRINGER UNDER END BAND.



Measure height of 1 x 2 or 1 x 4 stringer needed to butt against center of tile. Saw to width required. Carefully measure distance to gable edge at eave and again at ridge. Snap a chalk line. Nail eave enclosure in position. Notch end of stringer to project over base of eave enclosure, Illus. 233.

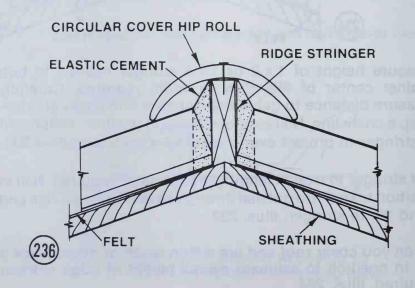
Cut stringer to overall length, eave to ridge, required. Nail in position to roof. Do not nail through eave enclosure. Nail end band tile to stringer, Illus. 232.

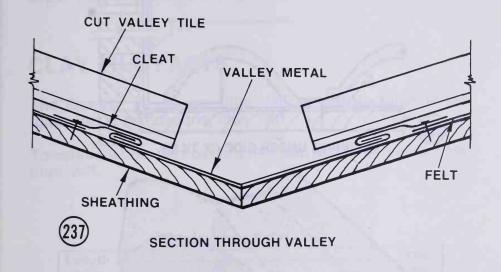
When you cover roof and are within reach of ridge, place a tile in position to estimate overall height of ridge stringer required, Illus. 234.



Cut stringer to height and overall length of ridge. Nail stringer in position. You can now apply the top course of tile. Close the end by nailing a top fixture, Illus. 235, in position. Some manufacturers also recommend using elastic cement to fill top end of tile, Illus. 234.

When you have completed applying tile to other side and have nailed top fixture in place, apply plastic cement to area covered by overlapping tile. Nail cover hip roll to ridge with 2½" copper nails.

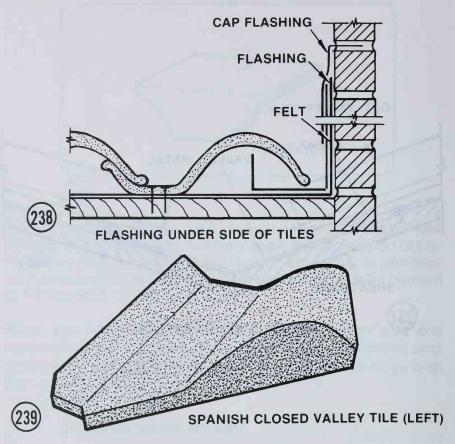




Allow a minimum 6" clearance alongside a valley, Illus. 237. Cut tiles for a valley to angle required. All tiles butting against a valley should be embedded in mortar.

Use 16 oz. copper at least 20" wide for a short valley, Illus. 237; at least 24" wide for a long valley. Using cleats retailer suggests, fasten in place. Allow 6" exposure of metal at top and increase width down valley approximately 1" for each 8 length.

Always try to use one length of copper in a valley. When it's necessary to use two or more lengths, start at eave, overlap each joint 4". Do not solder.



Extend flashing up sides of dormers, chimneys or adjacent walls and at least 6" up any vertical surface. Flashing under tile should never be less than 4". Turn up edge 1½", Illus. 238.

Start tiling a valley with Spanish closed valley tile, Illus. 239. These are available for left or right sides.

Snap chalk lines and cut tiles adjacent to a valley to angle required. Your tile retailer will recommend using a water cooled diamond blade saw or a tile setter's blade saw with tub. Many will rent these.

In heavy snow areas install Ludowici (Cody) Snow Guards. These should be staggered 30" on centers on top of the first six courses.

On steep roofs and all vertical applications, and in areas subjected to high wind currents, the wind tends to lift tile. To prevent this, apply a bead of sealant to area where tile overlaps. Use care not to get sealant on exposed surface. Your tile retailer will also recommend use of "hurricane clips." Space these according to retailer's recommendations.

CLAY TILE FACTS

The Spanish tile shown, Illus. 225, is manufactured to the following specifications, Illus. 240.

To estimate how tile covers a roof and length of rafters, note Illus. 241.

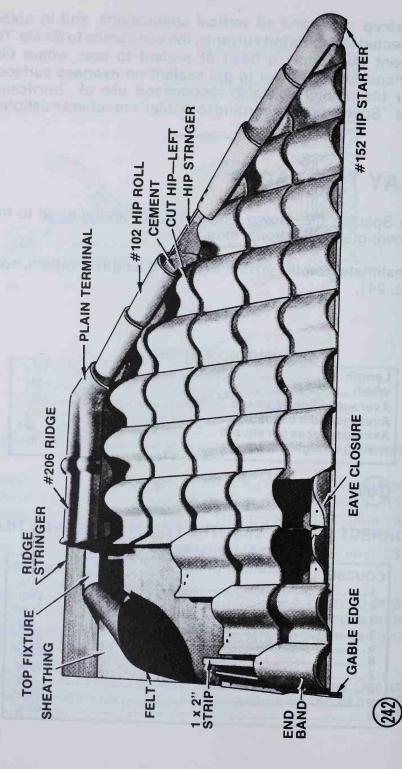
IMPORTANT DATA

131/4''
93/4"
101/4"
81/4"
171
900 lbs.



CORRECT RAFTER LENGTHS FOR FULL LENGTH TILES Based on 2" projection at eave of roof.

COURSE	RAFTER
1	11¼'
	21½'
3	31¾′
4	42'
	521/4'
	62½'
7	723/4'
	83'
9	931/4'
10	103½'



HIP AND RIDGE STRINGER HEIGHTS RIDGE HIP CIRCULAR CIRCULAR **ROOF PITCH** #206 COVERHIP #102 **COVER RIDGE** 4" Rise to 12" Run 5 " 6½"...... 4 9/16" 33/4" 5" Rise to 12" Run 47/8" 61/4" 41/2" 35/8" 13" Rise to 12" Run 41/2" 47/8" 37/8" 21/2"



Illus. 242 indicates location and name of various tile accessories.

Illus. 243 indicates height of a hip or ridge and the type of ridge required. These specifications are provided by manufacturer of tile illustrated.

Those who appreciate a sound, long term investment, but can't afford to apply a tile roof when they build, should cover roof with double coverage roll roofing as explained on page 84. Applying tile at a later date is easy.

how to FIND A JOB

While unemployment soars to record levels, jobs are available to all willing to work. The stumbling block to finding work can usually be traced to one's willingness to do something they haven't done before, or having tried and not been successful, they refuse to try again.

By some unanalyzed chemistry, we allow past experience to close rather than broaden our sphere of activity. We allow time and past experiences to fence us into smaller and smaller areas of activity. Since only you live your life, regardless of help you may receive from a family or friend, the need to continually test your capabilities determines how long and well you will live. You and current economic conditions are continually subject to change. Your physical, mental and economic well being requires an open mind, a willingness to try and try again. Only you can find the real you.

This book, like the others in this series, can help you get into a new and profitable field. It explains HOW you can become proficient in a trade that offers good living.

Whether you live in a low income housing complex or a single family home in suburbia, every building has a roof that constantly needs maintenance. Its repair is of equal importance to every owner or building manager. Since the lifespan of every roof is dependent on many elements, i.e., how and when it was applied, last inspected and resurfaced, decay from falling leaves or other debris, high winds, etc., learning to repair, resurface or apply new roofing offers unlimited job opportunities.

A roof in suburbia can be badly damaged by constantly being brushed by a low hanging branch of a nearby shade tree. It can be severely damaged by a build up of leaves in a gutter.

As this collects water that freezes in winter, the ice lifts shingles, cracks gutters or destroys fascia boards. You can get into the roofing trade by removing leaves and cleaning out gutters. You progress fast when you learn how to make hot and cold weather repairs.

The roofing trade requires an extension ladder. This can be rented for the time needed until you can afford one. It also requires a safety line, body harness and liability insurance that insures your customer for any damage you do to his property or any injury you sustain while on the premises. When you tell a prospective customer you carry insurance needed, you create confidence.

Getting any job or work as an independent contractor requires confidence plus the ability and willingness to do the work. Opportunities in this field are unlimited. As the population ages, it owns the greatest percentage of housing. Fewer homeowners have the capability, courage, eyesight or inclination to climb an extension ladder and clean leaves out of a gutter.

Phoning homeowners or leaving a printed or handwritten circular in the mailboxes of homeowners who can afford to hire someone to do this work results in getting jobs. One leads to another, and each satisfied customer will tell their friends. Those living in inner city buildings soon discover the building superintendent welcomes help when it comes to roofing maintenance.

When you inspect a gutter and remove all debris, put same in a plastic garbage bag tied to the ladder. Note whether any shingles are missing or loose and whether a previous winter freeze up did any damage to the gutter, valley flashing or fascia board. Check gutter brackets to make sure all are supporting the gutter.

Offer to do this work at an hourly wage the owner can afford and is willing to pay. This is one way to "get your foot in the door" to a lifetime trade. Since relatively few established roofers offer to make an annual checkup at the cost you charge, you can make many customers and still find the work profitable.

Learning to make repairs on the roof of your present home is the easiest way to get started. If, after reading through this book, you lack confidence, visit a home building center. Note the roofing material available and the samples that show how each should be applied. If you see a roofing job in progress, inquire if those doing the work need any help. Even if they only hire you to pick up all shingles dropped on the ground, it's a starter. On the next job, you may be able to do some of the work. If they don't need help, watch them work and you soon discover if they can do it, so can you.

Home improvement centers selling roofing material constantly sell to homeowners who do the work for the first time. Keep in contact with all who purchase roofing. Most welcome help they can afford. Climbing up and down a ladder can be a physical chore for some homeowners where it's easy for you. Always offer names of references, their addresses and telephone numbers. Have these on a typewritten sheet so the prospective customer doesn't have to try to remember it. Be sure you include your name, address and telephone number. Offering references as to your reliability can help a prospective customer decide to hire you.

Regardless of where you were born, race, religion or education, most of us pass through stages in which we gain or lose confidence. Your ego and self confidence will constantly be shattered by dashed hopes. Those who stop growing, and this can happen at every age, develop phobias about what they can or cannot do. Doing anything they haven't done before, like climbing a ladder to the roof of a second story house, creates fear. Those who realize what others can do, they can do, soon discover taking the necessary steps to insure their safety makes working on a ladder or roof easy.

A leaf filled gutter holds water. When this freezes, it expands and frequently cracks a gutter, loosens roofing and opens seams that leak. Mention these facts to every homeowner you phone. And phone every owner a few days or a week after leaving your circular in their mailbox. Most owners welcome help they can afford. While many owners will agree to your doing the work after they check your references, the smarter ones will want to call your insurance agent to make certain they are not liable for any injury you might sustain falling off a ladder.

If the question of safety is raised, explain how a broom handle placed across the upper half of a double hung window allows you to secure a ladder in place; how you use a body harness and safety line. And when you can afford insurance, be sure to carry the agent's name and telephone number with you along with the name of the insurance company and policy number.

Learning to make a meaningful contact with strangers in today's society requires your giving them answers to questions before being asked. Crime is Big Business. Most people are suspicious of strangers. Making contact requires instilling confidence. This results in getting work. Being able to sell yourself requires creating the right approach. TRY is a three letter word that can also describe The Real You.



HOW TO THINK METRIC

Government officials concerned with the adoption of the metric system are quick to warn anyone from attempting to make precise conversions. One quickly accepts this advice when they begin to convert yards to meters or vice versa. Place a metric ruler alongside a foot ruler and you get the message fast.

Since a meter equals 1.09361 yards, or 39%"+, the decimals can drive you up a creek. The government men suggest accepting a rough, rather than exact equivalent. They recommend considering a meter in the same way you presently use a yard. A kilometer as 0.6 of a mile. A kilogram or kilo as just over two pounds. A liter, a quart, with a small extra swig.

To more fully appreciate why a rough conversion is preferable, note the 6" rule alongside the metric rule. A meter contains 100 centimeters. A centimeter contains 10 millimeters.

As an introduction to the metric system, we used a metric rule to measure standard U.S. building materials. Since a 1 x 2 measures anywhere from $\frac{3}{4}$ to $\frac{25}{32}$ x $\frac{1}{2}$, which is typical of U.S. lumber sizes, the metric equivalents shown are only approximate.

Consider 1" equal to 2.54 centimeters; 10" = 25.4cm.

To multiply $4\frac{1}{4}$ " into centimeters: $4.25 \times 2.54 = 10.795$ or 10.8cm.

INCH -	MILLIMETER
1"	25.4
15/16	23.8
7/8	22.2
13/16	20.6
3/4	19.0
11/16	17.5
5/8	15.9
9/16	14.3
1/2	12.7
7/16	11.1
3/8	9.5
5/16	7.9
1/4	6.4
3/16	4.8
1/8	3.2
1/16	1.6

INCHES -	CENTIME	TERS
1		2.54
1/8		_2.9
	1/4	3.2
3/8		3.5
	1/2	3.8
5/8		4.1
	3/4	_4.4
7/8		_4.8
2		5.1
1/8		5.4
	1/4	5.7
3/8		6.0
	1/2	6.4
5/8		6.7
	3/4	_ 7.0
7/8		7.3
3		_ 7.6
1/8		7.9
	1/4	8.3
3/8		8.6
	1/2	_8.9
5/8		9.2
	3/4	9.5
7/8		9.8

4	COL	EMILET	10.2
	1/8_		10.5
		1/4	10.8
	3/8_		11.1
		1/2	11.4
	5/8_		11.7
		3/4	12.1
	7/8_		12.4
5			12.7
	1/8_		13.0
		1/4	13.3
	3/8_		13.7
		1/2	14.0
	5/8_	BEST 15 11	14.3
		3/4	14.6
	7/8_		14.9
6			15.2
	1/8_		15.6
		1/4	15.9
	3/8_		16.2
		1/2	16.5
	5/8_		16.8
			17.1
	7/8_		17.5
7	4./0		17.8
	1/8_		18.1 18.4
	3/8_		
	3/0_	1/2	18.7 19.1
	5/8_		19.1
	3/6_		19.4
	7/8_		20.0
8	"""		20.3
	1/8_		20.6
		1/4	21.0
	3/8_		21.3
		1/2	21.6
	5/8_		21.9
		3/4	22.2
	7/8_		22.5
9			22.9
	1/8_		23.2
		1/4	23.5
	3/8_		23.8
		1/2	24.1
	5/8_		24.4
		3/4	24.8
	7/8_		25.1
10			25.4
	1/8_		25.7
		1/4	
	3/8_		26.4
		1/2	26.7
	5/8_		27.0
		3/4	27.3
	7/8_		27.6

11	17.50	186 737	27.9
	1/8		28.3
		1/4	28.6
	3/8_		28.9
		1/2	29.2
	5/8_		29.5
		3/4	29.8
	7/8		30.2
12			30.5
	1/8_		30.8
		1/4	31.1
	3/8		31.4
		1/2	31.8
	5/8_		32.1
		3/4	32.4
	7/8_		32.7
14_			35.6
			40.6
20			50.8
30			76.2
40			و.۱۱۱
70			177.8
80			203.2
		-	228.6
100			254.0

FEET = INCHES = CENTIMETERS

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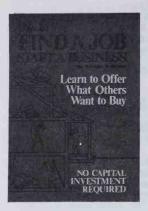
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#850 How to Find a Job, Start a Business

Get into the housing industry and building trades as well as dozens of other profitable business of your own enterprises without risking capital. Everyone who is willing to read and learn, then invest the time and effort doing what directions suggest, earn far more than they previously imagined possible. 210pp., 304 illus.



#816 How to Lay Ceramic Tile

Learn how to apply ceramic and quarry tile to floors, walls, counter tops and patios. Information about tools, materials, surface preparation, special situations and valuable time saving trade tips included. Directions explain how to build a quarry tile pad for woodburning stoves, how to apply decorative tile around fireplace and more. 178pp., 225 illus.



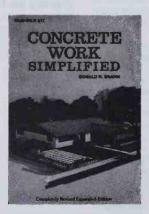
#697 Forms, Footings, Foundations, Framing, Stair Building

This book tells every reader how to get into the building industry. Whether you build your own house, buy a prefab or want a career in the building trades, this book explains and illustrates everything you need to know about forms, footings, foundations, framing and stair building. 210pp., 310 illus.



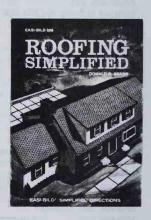
#668 Bricklaying Simplified

All who want an economical solution to a costly problem or seek employment in a trade where opportunity is unlimited will find this book an excellent guide. Directions explain how to veneer a house, build a barbecue, lay bricks for walls, walks and much more. Amateurs become pros. 146pp., 212 illus.



#617 Concrete Work Simplified

Explains everything you need to know for mixing concrete, floating, finishing, grooving, edging and pointing, setting ironwork and anchor bolts. Directions explain how to install an outside entry, waterproof a basement, install a sump pump and make all kinds of concrete repairs. 194pp., 257 illus.

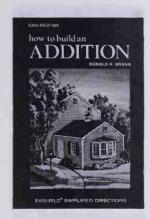


#896 Roofing Simplified

This business of your own book turns amateurs into professional roofers. Learn to repair or replace asphalt, wood or slate roof, apply roll roofing. Make a roofer's safety harness and learn how to walk and work on a roof with no fear of falling, plus much more. 176pp., 243 illus.



#685 How to Remodel Buildings With abandoned big city housing units available to all who are willing to rehabilitate and occupy same, this book explains how to become landlords with an investment of time and effort. It tells how to turn an abandoned multifamily building, store, garage or warehouse into rentable housing. Every step explained and illustrated. 258pp., 345 illus.



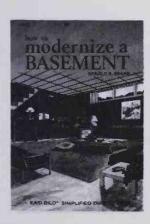
#609 How to Build an Addition

Creating additional living space can prove to be one of today's soundest investments. Step-by-step directions explain how to build a 12x16', 16x24' or any other size one or two story addition, with or without an outside entry. 162pp., 211 illus.



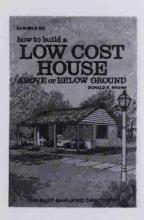
#773 How to

Create Room at the Top If you need one or more bedrooms, extra living space, or an income producing apartment with outside stairs, this book is your answer. Every step to building a dormer, installing a skylight, building and installing inside and outside stairs is completely explained and illustrated. 162pp., 239 illus.



#615 How to Modernize a Basement

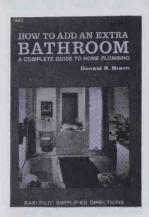
Create a family room or turn a basement into an income producing one room apartment with an outside entrance. Directions explain how to install an outside entry, build stairs, frame partitions, panel walls, lay floor tile and much more. 98pp., 135 illus.





#832 How to Build a Low Cost House— Above or Below Ground

A one story house over a full basement with cross ventilation, can provide low cost, energy saving shelter. With one bedroom on the first floor, and either one or two in the basement, it offers an amazing amount of living space. Those who prefer building an extended foundation, embanked by earth on three sides, discover its even less costly to heat in winter, cool in summer. Step by step directions take all the fear, mystery and inflated costs out of building this three bedroom house. 226pp., 177 illus.



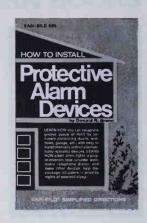
#682 How to Add an Extra Bathroom

This complete, easy to read guide to home plumbing helps make a dream come true for only the cost of fixtures. Directions explain how to make the installation and save a bundle. Those who don't want to do any plumbing still save by preparing the area, then having a plumber make the installation. 162pp., 200 illus.



#758 How to Modernize a Kitchen

Of special interest to homeowners who appreciate the convenience and Capital Gains of a completely modernized kitchen. Directions explain how to build base and wall cabinets to fit space available, or modernize existing wood or metal cabinets. Plan the kitchen that fills your family needs today and in the future. 210pp.,263illus.



#695 How to Install

Protective Alarm Devices

Recapture peace of mind by protecting all doors and windows with professional devices. Discourage a break-in with magnetic contacts that automatically notify police, install alarm bells, instantly detect movement with easy to install radar. A layman's guide to professional installation of alarm devices. 130pp., 146 illus.



#694 Electrical Repairs Simplified

Learn to economically make electrical repairs and earn extra income in your spare time. This book takes the fear, mystery and inflated cost out of many troublesome repairs. A special feature explains how to install wiring in a dollhouse. 134pp., 218 illus.



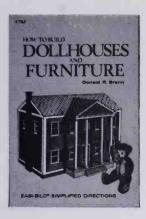
#875 Plumbing Repairs Simplified

Homeowners who dislike having their budget and peace of mind destroyed by a costly plumbing repair find this book helps save time, temper and money. Read, learn, then do what directions suggest and see how easily you can replace parts and make repairs like a pro. 226 pp.,841 illus.



#674 How to Install a Fireplace

Everyone who wants to build a brick fireplace, install a wood-burning stove or prefabricated metal fireplace and chimney, will find all the direction they need. Installing a chimney completely within or recessed flush with an outside wall is clearly explained and illustrated. 242pp., 354 illus.



#753 How to Build Dollhouses and Furniture

Create a memory a little girl will never forget. Directions explain how to build three different doll-houses, the installation of switch operated overhead lighting, plus full size patterns for the 14 pieces of dollhouse furniture. Those searching for a money making hobby find a ready market for dollhouses. 194pp., 316 illus.



#771 Toymaking and Children's Furniture Simplified

As every reader soon discovers, toymaking possesses a certain magic. Turning a piece of lumber into a whimsical rocking horse captures a child's imagination. Directions for pony ride rocker, giraffe clothes tree, bunk beds, toy chest and 12 other projects included. 194pp., 330 illus., plus a full size foldout pattern.



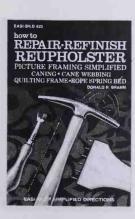
#792 How to Build Collectors' Display Cases

Learn to build museum quality, clear acrylic, floor, table top and wall display cases and cabinets. These provide the perfect way to protect and display treasured collections of dolls, figurines, etc. Retailers find these cases ideal to display merchandise. Directions also included for an outdoor display cabinet. 194pp., 229 illus.



#683 Carpeting Simplified

Laying carpet in your home can provide the experience needed to do the same work for others. Step-by-step directions explain how to install every type of carpeting, over any kind of floor, with or without padding. Simplified directions explain how to carpet stairs, install under-the-carpet electronic alarm mats and much more. 178pp., 223 illus.



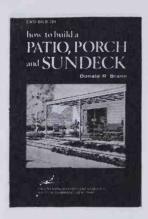
#823 How to Repair, Refinish, Reupholster

Learn to apply first aid to ailing furniture. Reglue joints, replace tenons, torn webbing, springs etc. Make a 28" picture frame clamp, a professional mat cutting board, a rope spring bed, and a 114" quilting frame. Everything you need to know from tacks to tools. 176 pp., 215 illus.



#605 How to Install Paneling

Learn to apply paneling like a pro. Build a matching wall-to-wall storage closet with sliding doors, a fireplace mantel, install valances with indirect lighting, even build a cedar lined storage room. 146pp., 214 illus., plus full size patterns simplify every step.



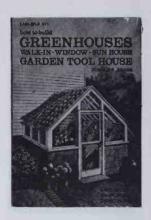
#781 How to Build a Patio, Porch and Sundeck

Build it yourself and take the inflated cost out of adding a front or back porch, patio or sundeck. Every step, from laying out footings to installing railings, is clearly illustrated and explained. Directions also explain how to make screens, porch repairs, swimming pool enclosure and much more. 146pp., 220 illus.



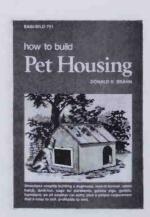
#754 How to Build Outdoor Furniture

Easy to follow step-by-step directions, plus a full size fold out pattern simplify tracing and cutting all parts to exact shape required. Learn how to build attractive curved back lawn chairs, chaise on wheels, picnic table and four passenger lawn glider. 130pp., 174 illus., plus full size pattern.



#811 How to Build Greenhouses

Of special interest to everyche who enjoys the fun and relaxation of growing plants year round. Learn how to build a walk-in or window greenhouse, a plastic covered sunhouse - greenhouse and garden toolhouse. A special section explains all about electric light gardening. A chart of decorative plants for the indoor garden is also included. 210pp.,229 illus.



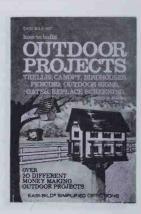
#751 How to Build Pet Housing The perfect book for pet lovers. Learn how to build a doghouse, lean-to kennel, rabbit hutch, duck

lean-to kennel, rabbit hutch, duck inn, catpartment, an all weather cat entry and cages for parakeets, guinea pigs, gerbils and hamsters. Step-by-step directions and illustrations explain every step. 178pp., 252 illus.



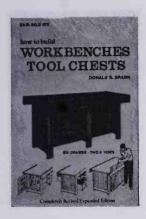
#669 How to Build Birdhouses & Birdfeeders

Attract friendly and beautiful birds by building birdhouses and feeders. Directions explain how to build a martin house, bluebird house, wren house, weathervane birdfeeder and much more. Full size patterns simplify building and insure success. 66pp. 88 illus.

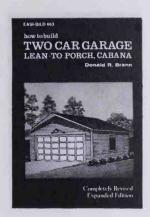


#807 How to Build Outdoor Projects

Step-by-step directions explain how to make over 20 outdoor projects. Learn to repair and replace window and door screening, build gates and fencing, door canopy, trellis, outdoor planters, birdhouses, feeders, signs and much more. 210pp., 212 illus.



#672 How to Build Workbenches Every home, apartment and place of business needs a workbench to economically make repairs and improvements. Build a 6' workbench with a 6' vise on one or both sides, big drawers and tool compartments. Directions for foldaway wall benches that require a minimum of floor space also included. 180pp., 250 illus., plus a full size foldout pattern.



#663 How to Build a Two Car Garage, Lean-To Porch, Cabana

A two car garage protects your car and adds storage space at low cost. Convert into an income producing one bedroom apartment with kitchen, bathroom, living room. Directions included to build a lean-to screened in porch with cabana containing dressing room and shower. 130pp., 142 illus.



#680 How to Build a One Car Garage, Carport, Convert a Garage into a Stable

Build a one car garage with ample space for a workshop, or turn a one car garage into a two box stall stable. Directions explain how to raise a garage to obtain extra headroom, build a carport, leanto toolhouse and a cupola. 146pp., 181 illus.



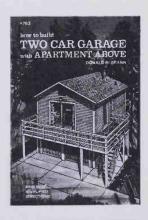
#679 How to Build a Stable and Red Barn Toolhouse

Directions explain how to build a 20x30', three box stall stable. Every step of construction from obtaining a permit to building a cupola is simply explained and illustrated. Directions also included for an 8x10' or larger red barn toolhouse. 178pp., 197 illus.



#684 How to Transform a Garage into Living Space

Create extra income by transforming a garage into a livingbedroom, with a kitchen and bath. Step-by-step directions and illustrations assume the reader has never done any of this work. 130pp., 139 illus.



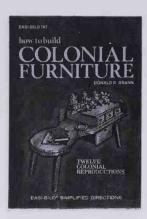
#763 How to Build a Two Car Garage with Apartment Above

All who seek an economical solution to a costly housing problem should read this book. Directions explain how to build a two car, two story garage or how to add a second story to an existing garage. Space above provides a living, bedroom, kitchen and bathroom. 194pp., 226 illus.



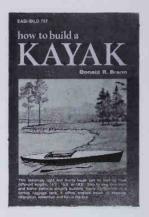
#756 Scroll Saw Projects

Discover how step-by-step directions and full size patterns simplify building the many projects offered. Directions included for wall shelves, plaques, planters. toys and much more. A good book for a begining woodworker, this book insures success. 27 full size patterns permit tracing all parts, then assembling each in exact position. 130pp., 146 illus.



#761 How to Build Colonial Furniture

You can easily obtain furniture at a fraction of retail cost by building colonial reproductions. Easy to follow directions and full size patterns simplify building a cobbler's bench, hutch cabinet, blanket chest, under the eaves rope bed, wall cabinet and more. 258pp., 342 illus.



#757 How to Build a Kayak

Simplified directions and full size frame patterns explain how to build this light yet sturdy kayak in three different lengths, 143", 16'9" and 18'0". Kayak can easily be carried on a cartop rack and used by one or two adults. Full size patterns insure cutting each frame to exact size required.



#690 How to Build Bars

Building a bar offers a fun way to furnish a recreation room, den or basement. Step-by-step directions and illustrations simplify building a wide assortment of seven different bars, including the popular L-shaped bar and TV bar. 162pp., 195 illus.



#630 How to Build Sportsman's Revolving Storage Cabinet

Of interest to every sportsman. Directions simplify building a glass enclosed gun cabinet, wall racks and a 24x72" revolving cabinet that stores everything from guns to clothing. Learn to build what others want to buy. 98pp., 121 illus.



#804 How to Build Bookcases and Stereo Cabinets

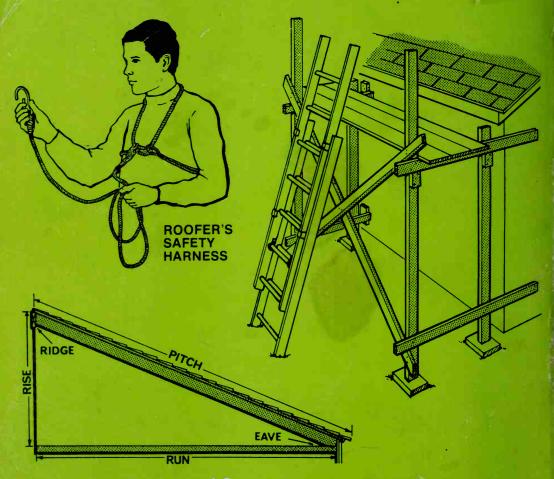
Takes all the mystery and ¾ the cost out of building bookcases and cabinets to fill any space available. Directions explain how to build wall to wall, built-in, free standing and sectional bookcases, stereo cabinets and much more. 194pp., 232 illus.



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